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ABSTRACT

The first section of this manual has been developed to help leaders and youth examine and gradually understand some of the more complex environmental factors. It helps to explain what things are where and why, why a certain project has been suggested, whether it is a practical one for a given place, and what must be known before it can be intelligently carried out. Activities and projects described in the second section deal with soil and land, water, forests, wildlife, minerals, and human resources. Indicated for each exercise is its purpose, suitable site, and procedure to accomplish the stated goal. These ideas are suggested to develop and utilize skills in analyzing and alleviating conservation needs. The appendix presents a conservation directory of federal, state, and local agencies and private organizations to which one may write for materials or information concerning conservation practices and natural resources. (BL)

NATURAL RESOURCES

help conserve them

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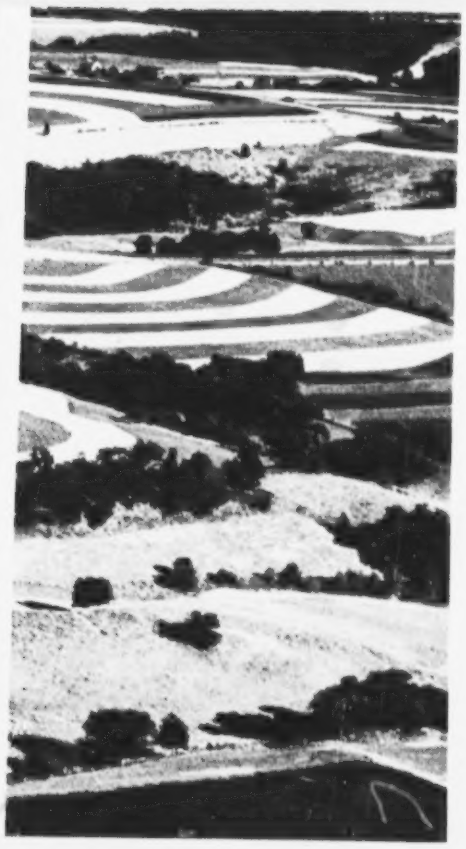
seek beauty

pursue knowledge

give service



CONSERVATION

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preface

A message to you

It is proverbially the youngest baby in the family that raises the most hob—and man is nature's youngest. . . . The Old Lady was already well set in her ways when he appeared. Repeatedly he has wrecked his home, repeatedly he has been spanked, but stubbornly he persists in having his own way which he calls 'The Conquest of Nature.' It is my suspicion that it is time for him to learn the House Rules . . . the question, of course, is 'What can be done.' Personally I think much can be done; but the problem is so big, it must be taken in small portions at a time, just as we do with any big and complex problem. These portions are the local communities in which each of us live, where we have a chance to see at first hand what is happening, and a chance as free men and women to do something about it. This is not only good technical conservation, but good political doctrine too, for as Lincoln suggested, a duty dodged is a privilege lost.

Paul B. Sears

You and the organization to which you belong are in the strategic position to witness and alleviate conservation problems at the vital community level. The purpose of this book is to help you learn the House Rules, understand why they are necessary, abide by them and enjoy the privileges they insure. The first section of the book will guide you in an exploration of your community's natural resources to find out "What's Where and Why" and to understand how conservation problems can and do exist. The second section of the book gives ideas for activities that can develop and utilize your skills in analyzing and alleviating conservation needs.

Department of Program
Camp Fire Girls, Inc.

Paul B. Sears, Chairman of the Yale Conservation program and Past President of the American Association for the Advancement of Science, is the author of many books on conservation, of which the best known is Deserts on the March.

acknowledgments

Many of the projects and activities listed in the last six sections of this handbook have appeared in numerous publications of federal and state government agencies and private conservation organizations listed in the Conservation Directory.

The assistance of Dr. Paul B. Sears, Chairman of the Yale Conservation Program and Dr. Richard Weaver, Department of Conservation, University of Michigan, made possible a vast reference file of publications and graduate student contributions. Miss Jane Brown, assistant in the Department of Conservation, University of Michigan, developed the introductions for the sections on Water, Soil and Land, Forests, Wildlife, Minerals, and Human Resources.

introduction

CONSERVATION: To State the Essence

The essence of conservation is an attitude towards the world and towards people. It helps people to use the resources of the world wisely and to develop them intelligently. Similarly the attitude towards people is one of giving them the environment to develop to their fullest potential, of helping people use themselves wisely and well.

Paul B. Sears

CONSERVATION: To Insure the Essentials

In primitive society, the survival of every individual depended on a definite knowledge of the plants and animals around him. Today it is also important for us to have an intelligent knowledge of our environment. We need to look more carefully, to allow ourselves time to think about what we see, and to explore what we do not see immediately. There are countless things that we see every day and do every day. Do we really understand what we see and what we do? Parents drive their children to school, to family gatherings and to vacation areas. We must obtain licenses to prove that we "know how to drive." Do we really understand what we are doing when we turn the ignition key or step on the brakes? How aware are we of the chain of reactions that are taking place under the hood and beneath the body of the car?

These unseen activities are part of a chain of reactions. We may witness only the beginning or the end. Often our thinking and thus our understanding are limited to those things we can easily see. It is not essential for us to become a nation of experts; but with greater specialization in occupations and daily living, it is essential that we become a nation with a viewpoint broader than our own personal and immediate actions.

I did not choose the example of a car engine to transfer you from the world of nature to the world of machines in the introduction to a book that is primarily a guide for you and the girls in exploring the natural world. However, it is highly probable that you, as I, have shared the experience of a woman driver confronted with a potential chain reaction that did not react. Usually a mechanic can repair the car in what we term a "reasonable" or "unreasonable" length of time. Some of the damage that we often unknowingly do to the natural resources of our country takes so long to repair that we will not be around even to term the repair time "unreasonable."

At an ever increasing pace scientific advances are making it possible for us to start and control many complex activities in the world of nature as well as in the world of machines. The machines we use are continually modified to suit our needs. When we attempt to modify our natural surroundings we must recognize that the activities and chain reactions that occur are governed by the basic laws of nature. The laws have not been repealed. They provide a natural balance of life. The unfortunate consequences are ours when we upset the balance without understanding what we are seeing or doing. The faster our control increases, the faster we must develop understanding of the present and future results of any changes made possible by our control.

The natural balance of life allows physical and biological cycles to reassemble organisms as fast as they are dispersed. Our daily demands for goods and services constantly interrupt, accelerate or slow down many of the physical and biological processes that are steps to the completion of a cycle. If we wish to use and benefit from the products of cycles, we must plan and account for the degree to which we modify a cycle.

In a cycle, living and non-living objects and forces are essential. For example, the chemical elements (nitrogen, phosphorus, etc.) required by organisms follow what could be termed "paths" from a living organism to the environment and back to the living organism. Along these "paths" are processing agents such as bacteria and climate that gradually alter the nature of the chemical element so that it is able to continue on its way.

On a small scale suppose we pick one leaf. If this leaf never falls to the ground, bacteria will have one less leaf to decay. The leaf's organic remains and chemical content will not be added to the soil. The soil will have less to offer the hungry roots of a new plant, a new plant less food to process and to nourish the development of its blossom and eventually the seed containing the embryo of new life. A plant poorly nourished might be smaller or contain less of the essential elements for life. Animals depending on the plant may find less food or less nourishing food; the decay of the plant feed fewer bacteria and release less nutrients to the soil.

In reality one less leaf would probably fail to have any noticeable effect on the products of a cycle or on our use of the products. However, on a large scale the effects may be major, even though they may take a long time to show. We need to recognize that cycles, though not readily apparent, do exist. They are a thread in the web of natural processes that snare the elements essential to the major cycles of life. They govern the structure and function of natural communities and the communities of which we are members. We are among the organisms that are affected by these cycles. Also we are the organisms that can most easily and extensively affect these cycles. This power places on us a grave responsibility. Recognizing and accepting this responsibility is the key to the only practical application of conservation measures.

Practical conservation measures demand intelligent understanding. A broad view of some of the things we do each day can increase our understanding without requiring the training needed by an expert. Our morning paper may contain a report of the current pulp timber supply in practical terms of cords harvested, future supply, present and predicted expenditures and income. The paper in our hands is probably the product of processing by a number of vast industrial giants. But these giants depend on the tiniest bacteria for processing steps that way down the production line helped assemble the soil nutrients for the growth of pulp timber. Maybe some good armchair philosophers can vie with our armchair detectives and armchair politicians to look at the little clues and events upon which to build a broader picture and a more practical philosophy to govern attitudes towards the land.

We all possess the potential ability to promote and participate in practical conservation. The second section of this manual contains a listing of conservation activities and projects, but probably the most important job in conservation is to establish in the minds of the general public that we are members and not a master of the complex natural community and environment in which we live. Our complex environment must be studied and modified as a whole and not on the basis of isolated projects. This does not mean that we have to do more than one project at a time, but that before we act we consider the effects of one project on the whole.

We might go all out to dump substances into our water to control swimmers' itch and then complain about poor fishing, corset a river with levees and dams and feel injured when the constriction from increased taxes for dredging squeezes our budget.

It is true that our way of life makes it necessary for us to alter some desirable aspects to acquire those things we term more desirable. To make these value judgments competently we need to recognize that no more itch may mean no more fish. Engines and governments we recognize as organisms whose constitutions we guard from hasty and amateur tinkering. Do we have enough understanding to offer the same protection to the constitution of our soil and water?

The first section of this manual has been developed to help leaders and youth examine and gradually understand more of the complex environmental factors that the second section projects are designed to maintain or alter. It may help to explain what things are where and why, why a certain project has been suggested, whether it is a practical one for a given place, and what must be known before it can be intelligently carried out. The girls may attain and enjoy specific skills, but it is far more important that they understand the reasons for developing the skills and the significance of the results that these skills contribute. They should recognize that man has a lot to learn before he can wisely manage anything and probably too much to learn before he can manage everything. We can serve ourselves, our community, our nation and the world by acquiring the philosophy, knowledge, and understanding which will enable us to live in accord with the land and not "off the land."

Nan M. Harman

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first things first

BE ON THE SAFE SIDE

Before you do any of the activities in this book make sure you observe safety precautions. Here are three additional musts you may not have thought of:

Have first aid equipment along on all activities requiring the use of sharp tools.*

Check with someone about currents, tides, quicksand, etc., when working in and around water or swamp areas.

Have enough adults for the number of girls participating.

ABIDE BY THE LAW

Make sure you have the property owner's permission if you are planning an activity on someone else's land.

It is essential in all states but those with riparian water rights, to obtain permission from local authorities before doing activities that would change the quality or quantity of water.

**The Red Cross First Aid Course is an excellent way to acquire proper training in safety. Consult your local Red Cross Chapter for information. Remember human resources are valuable!*

7

WHAT'S WHERE AND WHY

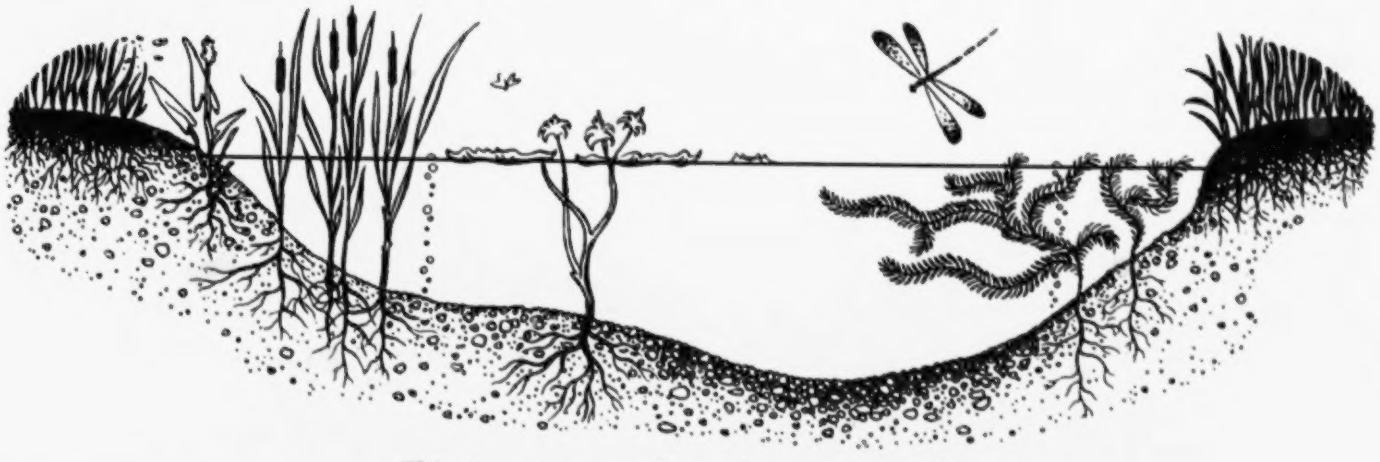
Outlines for study of selected natural communities.

What's Where and Why—this section of the book is not going to give the answers, but it will show you how to look for the answers.

You could answer "what's where" by wandering around a very large area and making a list of what you see, hear, etc., and opposite your list of "whats" making a list of "wheres." Often this procedure would make it difficult to answer "why." One of the best ways to answer all three questions together is to pick a natural community such as a pond, or a woods, and really investigate it. The following are brief outlines for what to look for and where to look. If you find enough "whats" in enough "wheres" within a fairly small area, you can piece this information together and deduce some "whys."

Why "what" you have seen is "where" you have seen it, is because every "what" is adapted so it can live or can't live in a certain "where"! Its shape, appendages, metabolism, digestive system and breathing organs make it possible to eat some things and not others, overcome some enemies and not others, survive or die in too much light and too much dark, or in too cold water or too warm water, to reproduce or not to reproduce. Each thing has a certain place it can live in and a certain job to do in the community. If the places aren't there and the jobs aren't done, the whole community structure would not exist. If you destroy or change any one thing in the community, you change the whole community in a chain reaction. Some chain reactions will lead to better communities, some to poorer communities.

A POND OR LAKE COMMUNITY



This is a cross section of a pond or lake

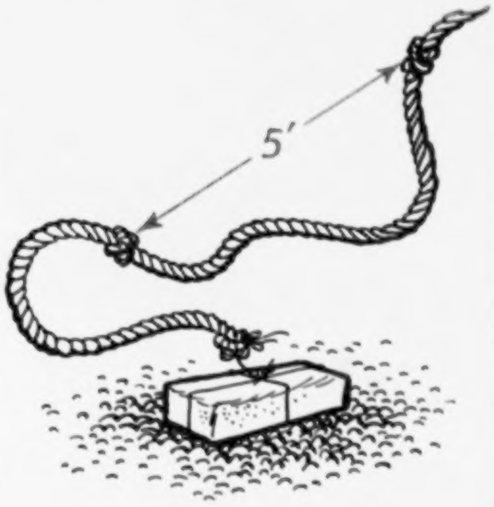
Here are some questions for you to answer and some helps on how to find the answers:

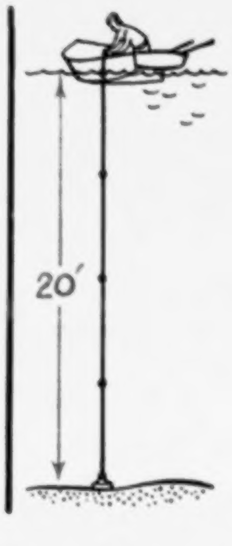
1. What is the name of the lake or pond and where is it located?
2. Is it a natural lake or a man-made lake? Look around the edges of the lake for: dams, dikes, man-made water inlets.
3. How is the lake affected by the land around it? Look for hills and trees that would shade the lake or protect it from winds, plants or flat ground that would decrease the amount of soil that comes into the lake.
4. How big is the lake? Figure out the size from a scaled map or see a simple book on orienteering and find out how to map the lake shore and depth.
5. Is the shoreline regular in outline or full of little bays, inlets or dents? The more irregular it is the more little places in shallow waters for things to live.
6. What depth is the water in various places? Take a clothesline knotted at 5-foot intervals with a weight on the end. From a boat or various spots along the shore sink the line and determine the number of feet by counting the number of knots that are passed before the weight hits bottom.

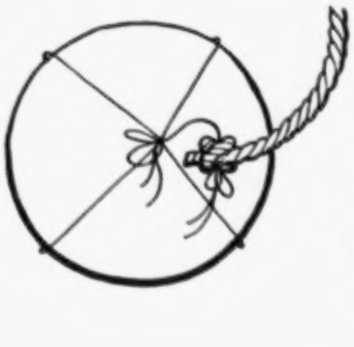
7. How far down will light penetrate the water? Remember plants need light to grow and even in shallow water there may be so much sediment suspended in the water that light can't get through. Take the weight off your knotted rope and put on a round white disc (a top from a #10 tin can could be used) attached at its center. Lower it into the water and see how far down you can still see it. If there is much light where the disc is, it will reflect the light so you can see it.

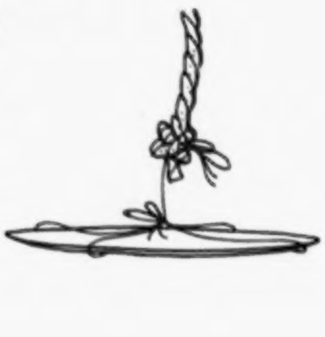
8. How does the water get in and out of the lake? Streams are easy to spot. Spring feeding of the lake may mean very cold water over the spring and you'll have to take the temperature of the water in many places to see if the water may be entering the lake via springs.

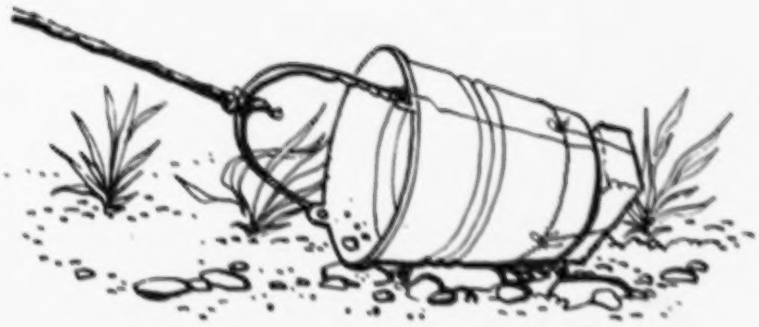
9. How cold is the water? Remember that the heat comes from the sun and from reflected warmth of rocks and sands on the shores or bottom of the lake or a warm stream or spring that enters the lake. Is the water warmer at the top or bottom? Lower a thermometer tied to your knotted rope to different depths. If the lake is stream fed, is the water warmer or colder coming into the lake or going out of the lake? Is the water at various depths warmer or colder than the air? In different seasons is the water ever warmer than the air?



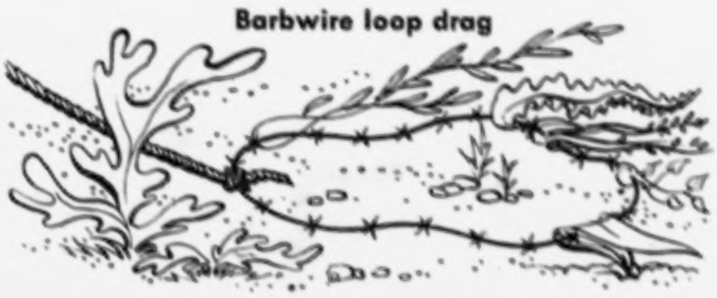


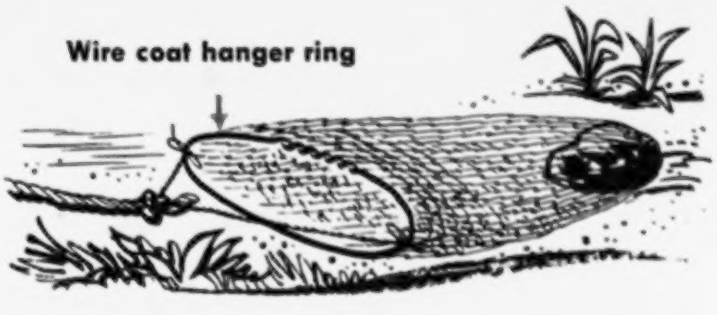


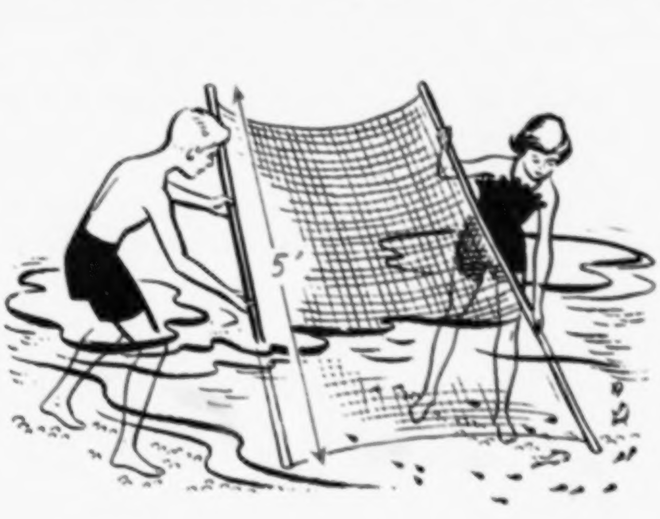




10. What is on the bottom? In deep water tie a weight to a bucket and drag up some bottom material. If it is solid hard rock you'll know by getting up an empty bucket. You'll probably get a few weeds if there are good weed beds. Wash the bottom material in a sieve or strainer. Dump it into a white porce-



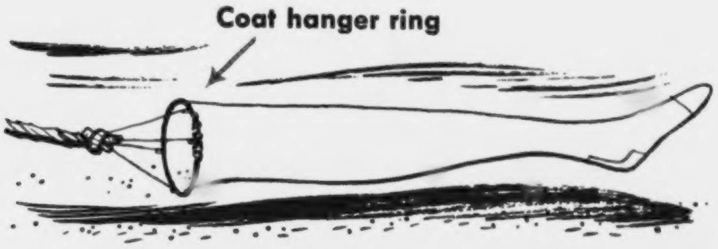




lain pan or tray and look for insects, little red or little brown worms.

11. What grows in the shallow water? Drag in some of the plants and take a good look at them.

12. What lives in the shallow water? Drag a simple bag dredge and wash material in the bag through a sieve onto a rag to examine it; put a person on each pole of a seine and walk along the shallows with the poles held at a slight angle and the bottom of the mesh close to the bottom of the lake or pond.



13. What else lives in the lake? Drag a stocking plankton net in the water. You may find a slimy substance that is little organisms known collectively as plankton. Some of these are big enough to see if you wash the slime into a jar of clear water and hold it up to the light. Some of these organisms make their own food and are in turn eaten by some of the insects you have found. Bigger insects may eat little ones. Frogs eat insects and fish eat insects and frogs and you eat fish.

14. What fish are present? Go fishing. You may find what you're going to eat has eaten some of the things you've seen. Cut open the stomach and see!

A RIVER OR STREAM COMMUNITY

Hike up and down the stream

Trace the stream on a map

Here are some questions for you to answer and some helps on how to find the answers:

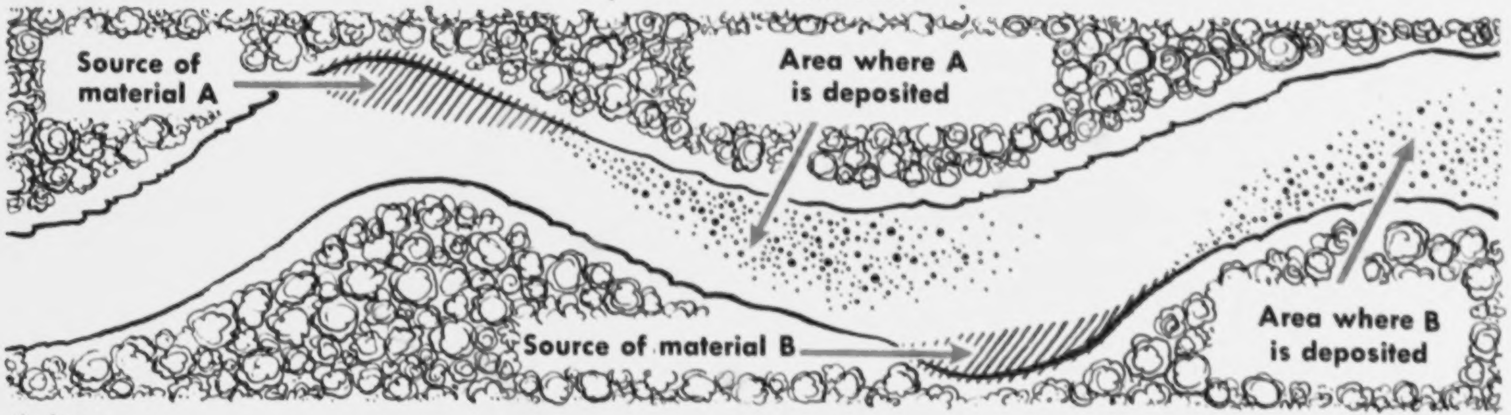
1. What is the name of the river or stream and where is it located?

2. Where does the water come from and where does it go?

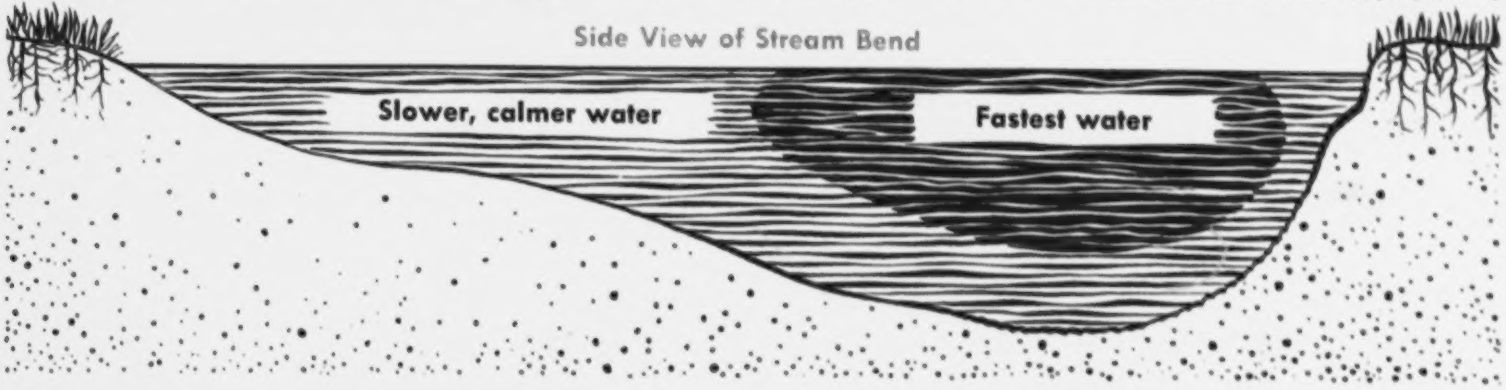
3. How is the stream affected by the land around it? Look to see if the steepness or flatness of the land makes the water run fast or slow. See if the stream is carrying soil, sticks, leaves, etc. Figure out where this load came from. Notice whether trees or shrubs shade the water.

4. What does the water do to the banks of the stream?

Top View of Stream Bend



Side View of Stream Bend

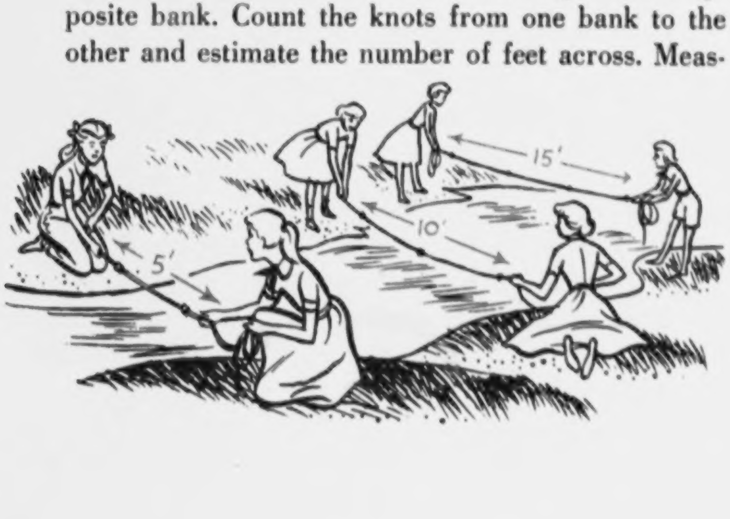


Watch the water carefully along the edges. Throw in a small stick above a bend and see to which side of the bend the stick tends to go.

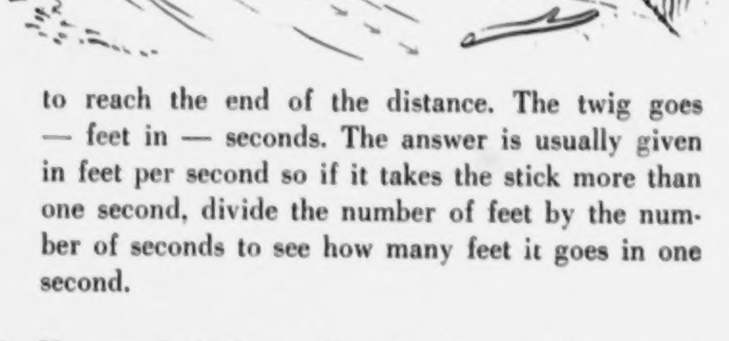
Look for any differences in the banks and in the depth on the two sides of the bend.

5. What is the average depth of the stream where you are? Take a yardstick and wade back and forth through the water several times in a straight line. Add up the different depths and divide by the number of figures in your column. If the water is too deep to wade use the knotted clothesline as in #6 under *Lakes and Ponds* and take soundings from a boat. If your answer is in terms of inches, change it to feet by dividing by twelve.

6. What is the average width of the stream where you are? Take your knotted clothesline and hold one end and have another person stretch the rope to the opposite bank. Count the knots from one bank to the other and estimate the number of feet across. Measure across in several places, add the figures in the column and divide by the number of measurements in your column.



7. How fast does the water flow? Measure a given distance downstream with your knotted rope. Have a friend throw in a twig at the beginning of the measured distance and count the seconds the twig takes to reach the end of the distance. The twig goes — feet in — seconds. The answer is usually given in feet per second so if it takes the stick more than one second, divide the number of feet by the number of seconds to see how many feet it goes in one second.

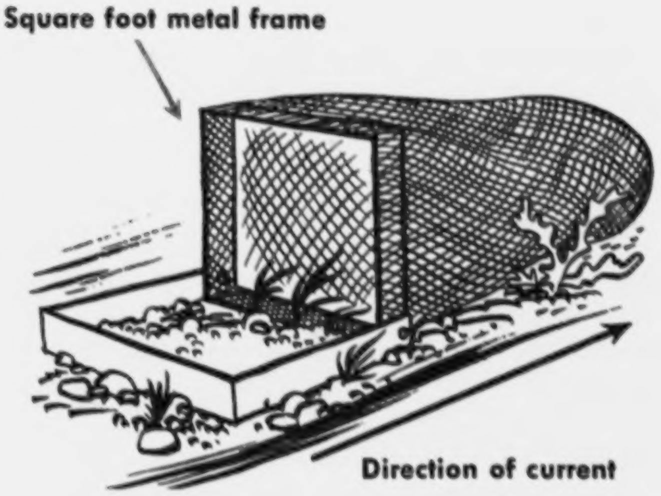


8. How much (volume of) water flows in the area of the stream where you are? Your answer will be in terms of cubic feet per second and is called the "discharge." Discharge equals the speed or velocity of the water times the amount of room the water has

in a cross-sectional area of a stream. When you did #7 you found out how fast the water was moving, so many feet per second. To find out how much room the water has, multiply the distance the stick traveled when you timed it in #7, times the average depth (#5), times the average width (#6). Length (#7) times average depth (#5), times average width (#6) is — cubic feet and is the volume of water you have measured in your stream area. This volume times the speed of the water is the discharge. Discharge equals — cubic feet per second.

9. What are some of the places in the stream where organisms can live? Look for these:
   - Open water
   - Rock ledges
   - Cobblestones, boulders
   - Gravel, mud, or sand
   - Waterfalls
   - Rapids
   - Pools
   - Calm places
   - Dents in the shore

10. What things live in your stream? Look at any plants that are growing. Try making the sampler below. Set it in the water so the opening of the cheesecloth bag faces upstream. Pick up all the stones or gravel or sand or mud near the surface of the bottom and rub your hands over or through the material. Little larvae or insects that are present will be washed into the sack. Rinse the sack into a white porcelain pan and count and try to identify what you find in just one square foot. Use the seine and your hands to catch bigger inhabitants.



11. Why can what you find live where it does? Think what it must do to live there:
    - Be able to travel around to catch food or stick in one spot and trap food.
    - Breathe.
    - Escape its enemies.
    - What else?

    Look for:
    - Camouflage coloring
    - Streamlined bodies
    - Flat bodies
    - Hooks
    - Suckers
    - Swimming legs, etc.
    - Burrowing bodies
    - Breathing organs
    - Which of these are most common in fast water?
    - Which in slow water?

12. How do streams differ from lakes and ponds? Think about or investigate these things:
    - The amount of oxygen that can enter water mixed by tumbling over stones.
    - The degree of difference in temperature from top to bottom in shallow, circulating water.
    - The amount of water in a stream at one place compared to the amount of water in a lake.
    - The scouring and digging action of the stream current.
    - The degree to which the organisms depend on the surrounding land for food, for a place to lay their eggs, for home during part of their later life.

    What you find can live where you find it only if the things in the list above aren't changed too greatly.

A WOODS OR FOREST COMMUNITY

1. How many trees, what species of trees and what size of each species grow in an area of woodland or forest? You don't have to count them all. Take a sample of 1/5 of an acre.

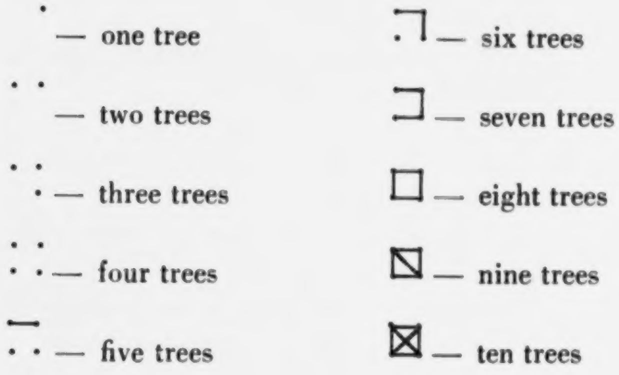
   Make a chart like the one on the next page to fit in your notebook or on a clipboard:

   Walk in straight parallel lines back and forth across your area counting the trees, estimating the size

		PINE				OAK				MAPLE				ETC.			
Ht. in feet		6	15	20	35	6	15	20	35	6	15	20	35	6	15	20	35
DBH 3																	
7					●												
9																	
11																	
13																	

NOTE: The height and dbh scales (diameter at breast height—about four feet above ground) on this chart can be adjusted to fit the size of trees you are working with.

of each tree growing within an area four feet to the left and four feet to the right of you until you have covered the whole area. Record the kind and size by placing a dot for each tree in the proper column. If you had one pine seven inches around and thirty-five feet tall the dot would go opposite the dbh figure 7 and under the height column 35. If you have lots of the same kind of tree, here is a way to make your dots easy to count:



Which species are the biggest? Which species look as though they've been living in the woods longest? Which species are most abundant? Which species seem to be the youngest members of the tree community? Look at your chart for the answers and at the condition of the trees, their shape, and the room they have to grow in.

2. What grows under the trees? Count the shrubs and record the names if you can find out what they are. Lay a piece of string 50 feet long on the ground and count the number of different kinds of ground cover plants that touch the string.

3. In what kind of soil are the plants you've counted growing? See if you can discover what the rotting material on the top of the soil is made of and how deeply the rotted pieces are mixed in. Dig a pit about three feet deep and one and one-half feet wide and examine the sides of the pit to see if the soil is the same all the way down.

   Put some soil in a jar of water and shake it, then let the jar stand. Examine any material that floats and any material that settles in the bottom of the jar.

4. How do the plants affect the "climate" in the woods? Put pans of water in the shade of the woods and other pans in an open area near the woods. See from which the water evaporates first. Leave empty pans in both places and see which the rain fills first. Keep a record of the temperature in the shade of the woods and in the open and compare them. Walk into a woods on a very windy day and see if the wind feels as strong in the woods as outside the woods.

5. What lives in the woods? Look for tracks, chewed plants, droppings, nests, dens, holes. Push a stick down a hole and dig up one of the long underground tunnels. Measure off a square foot area and dig up the soil to a depth of three inches. Shake the dirt through a kitchen sieve onto a piece of white cloth. Look for insects, grubs, worms, centipedes, etc. Sit and listen to the birds. Make an insect net and take fifty "sweeps" high up, fifty low down, and fifty around the leaves of shrubs. Look at what you caught!

6. Need a rest from all this activity? Sit down on a rotting log. Pull it apart and look for any little animal and plant life. Keep settin' but don't let your

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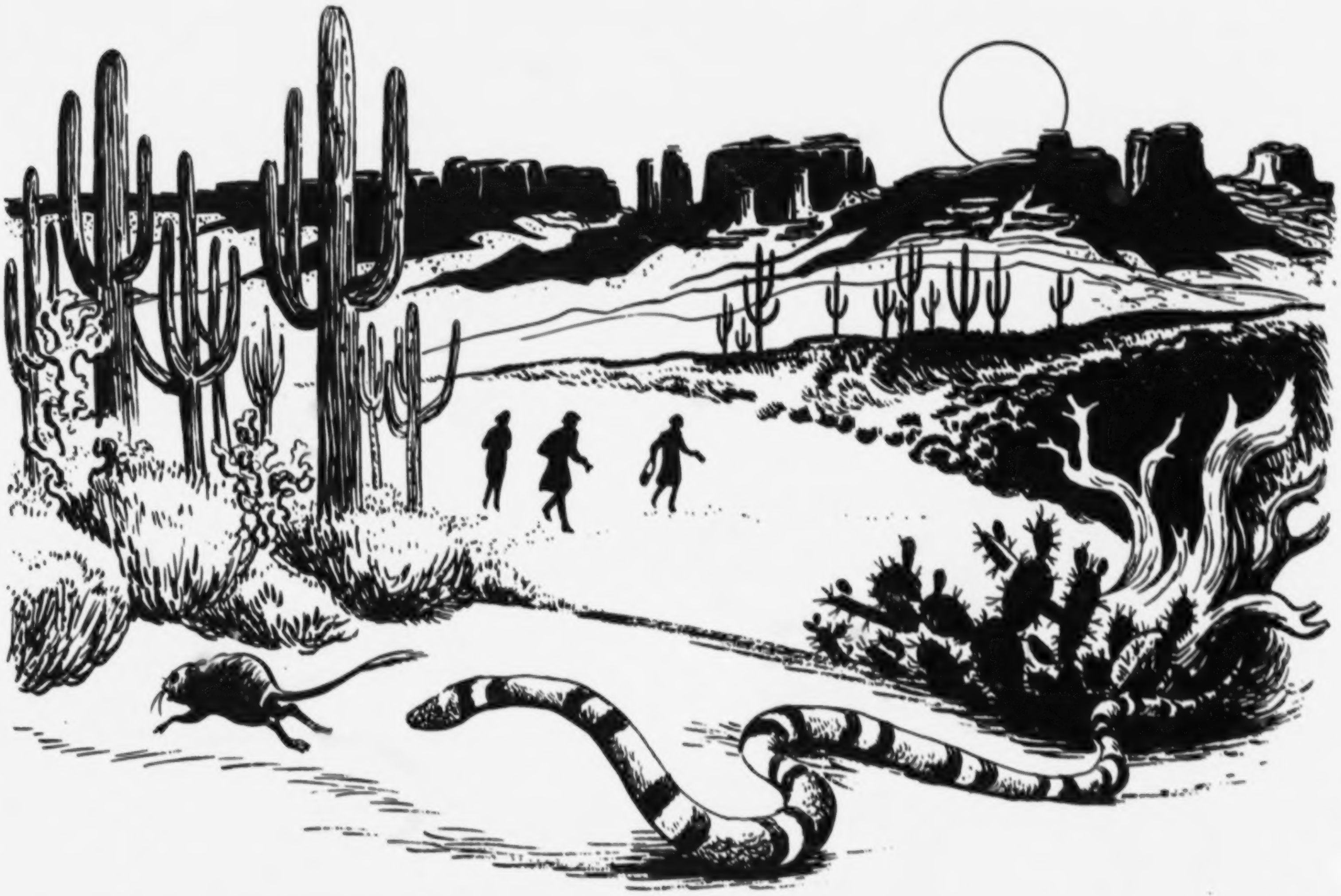
**See placement of on chart.*

mind get lazy. Remember a tree feeds on the nutrients in the soil; it houses in its trunk and branches the birds and animals that eat its seeds and eat the mice and shrews that chew on its roots that draw food for the leaves which fall and rot and add nutrients to the soil that supplies food to the tree that some day will die and make a rotting log for you to sit on and pull apart.

A DESERT OR BEACH COMMUNITY

1. What kind of plants grow on the desert or beach? Use the 1/5 acre count or "string line" count as in #1 or #2 under *Woods or Forest.* Note the spacing of plants and the difference in numbers of plants in the different seasons.

2. What kinds of animals live on the desert or beach? Look for birds in the sky, holes made by birds in large plants or in the sides of gully banks, droppings containing the skeletons of mice and other rodents, and footprints. Near a dead animal is a good place to watch for scavenger birds. Look for rodent holes or crab holes and little soil mounds on the ground. Look for tracks and footprints. Many of the small animals leave a thin line in the soil surface between the impressions of their feet. They are dragging something—a tail. Some little beach animals drag their feet. To get a look at some insect life, dig up a square foot of soil and sieve it as in #5 under *Woods or Forest.* Take fifty sweeps with your insect net in various places and search the plants carefully. Take a trip at night with a flashlight and wear warm clothes.



3. What is the soil in the desert or beach like? Shake some soil in a bottle of water as in #3 under *Woods or Forest.* Decide whether most of the particles are heavy and sink or whether they are light and stay suspended. Pour some water on the soil surface to see if it makes puddles or sinks in rapidly. Remember that if the water runs away too deeply underground or if it stands in puddles on the ground so it is evaporated by the desert sun, the plant roots cannot trap it.

4. How does the climate affect the soil? Lay a ther-

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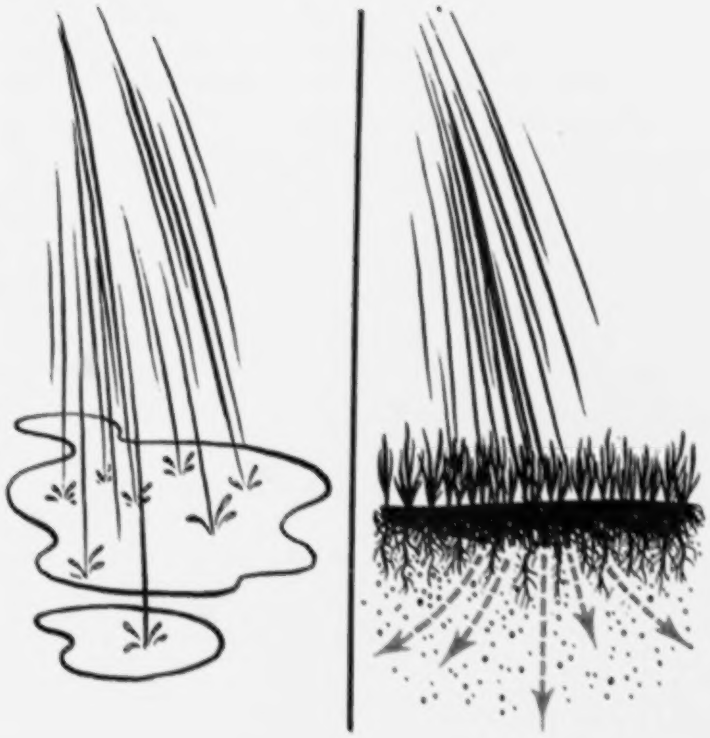
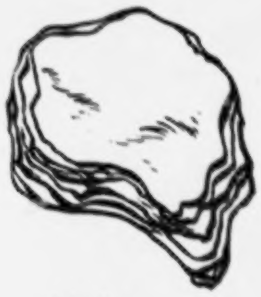
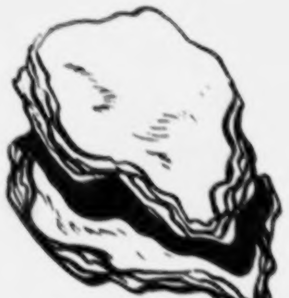


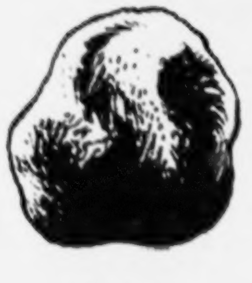
mometer on the soil at mid-day and at night to see extremes in temperature. If you have a sandy desert or beach, push some boards into the sand and see what happens to the sand when the wind blows. On a shale or cobblestone beach look to see how the shale is cracked apart or the cobbles worn smooth by friction of the water or sand particles. On a clay hardpan desert or beach look for cracks in the soil made by shrinking. Try to get a look at what happens to these cracks when it rains. Leave some pans on the desert or beach to catch rain (or fill the pans with water) and see how rapidly the water evaporates.



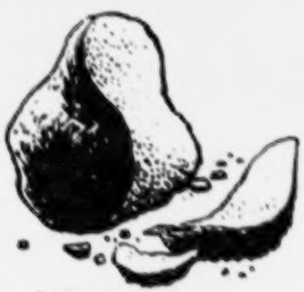
Shale



Split Shale



Cobblestone



Split Cobblestone

5. How can plants live on the beach or desert? Determine what plants escape the heat and winds in any of the following ways:

   a. lying in the dry soil as seeds until the rain comes and then producing a new seed crop in about six weeks.

   b. growing only in favorable seasons, never getting very big, growing far apart so they don't have to compete with other plants for water, having most of their parts underground.

   c. dropping their leaves in dry seasons and staying in an almost completely inactive condition until moisture returns.

   d. absorbing water rapidly in wet seasons, storing water in fleshy leaves, stems and roots; having a waxy coating on leaves to help keep moisture inside.

   e. having roots that spread way out to find water and are able to anchor the plant against strong winds. You may have to dig for the answer to this.

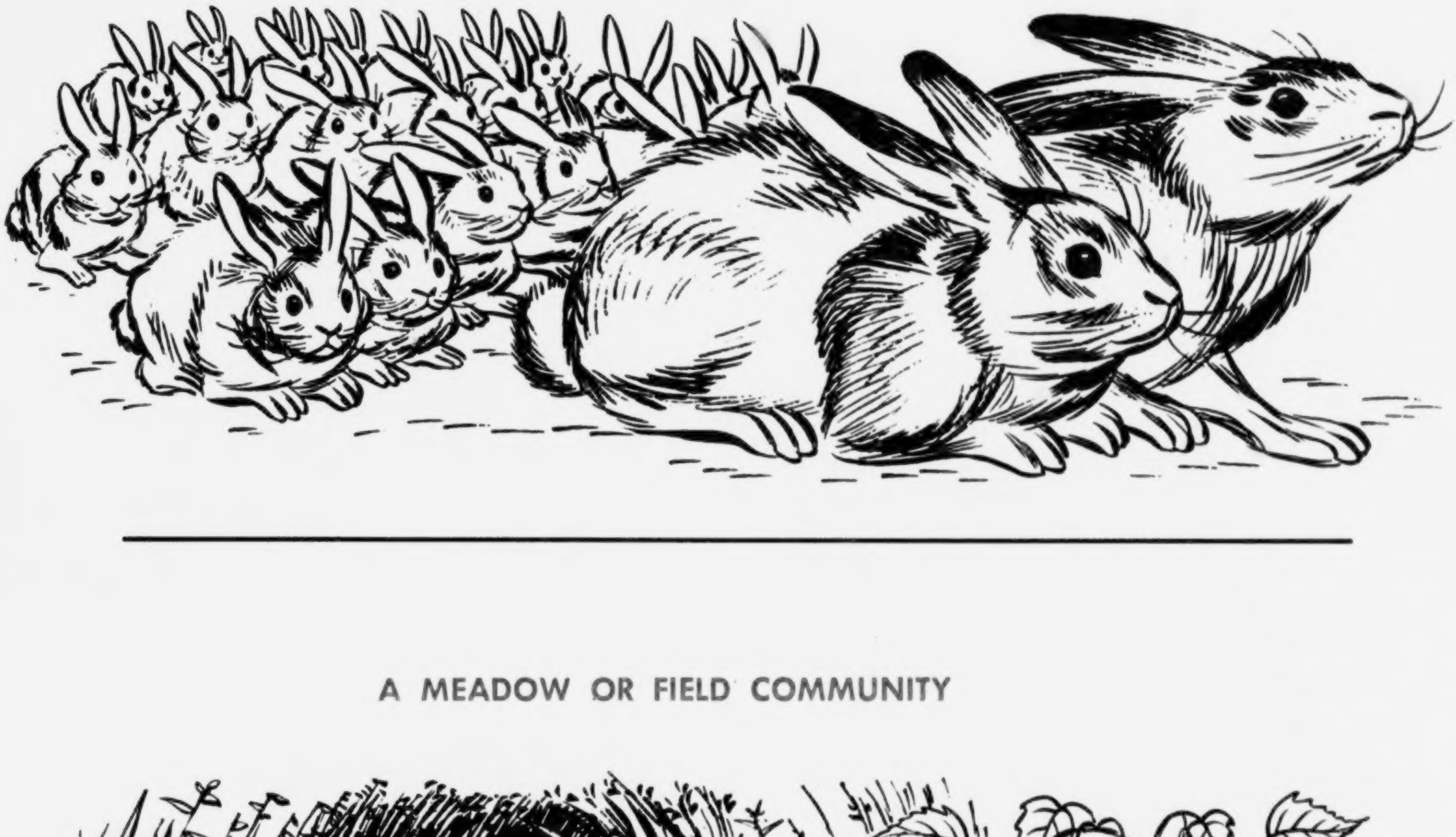
6. How can animals live on the desert or beach? They must have a place to live. Investigate the possible sites for homes. Don't overlook little crevices in rocks, the hollow stems of some plants, and all the room under the ground. They must have shelter from the sun. Discover which animals escape the sun in the following ways:

   a. coming out only at night.

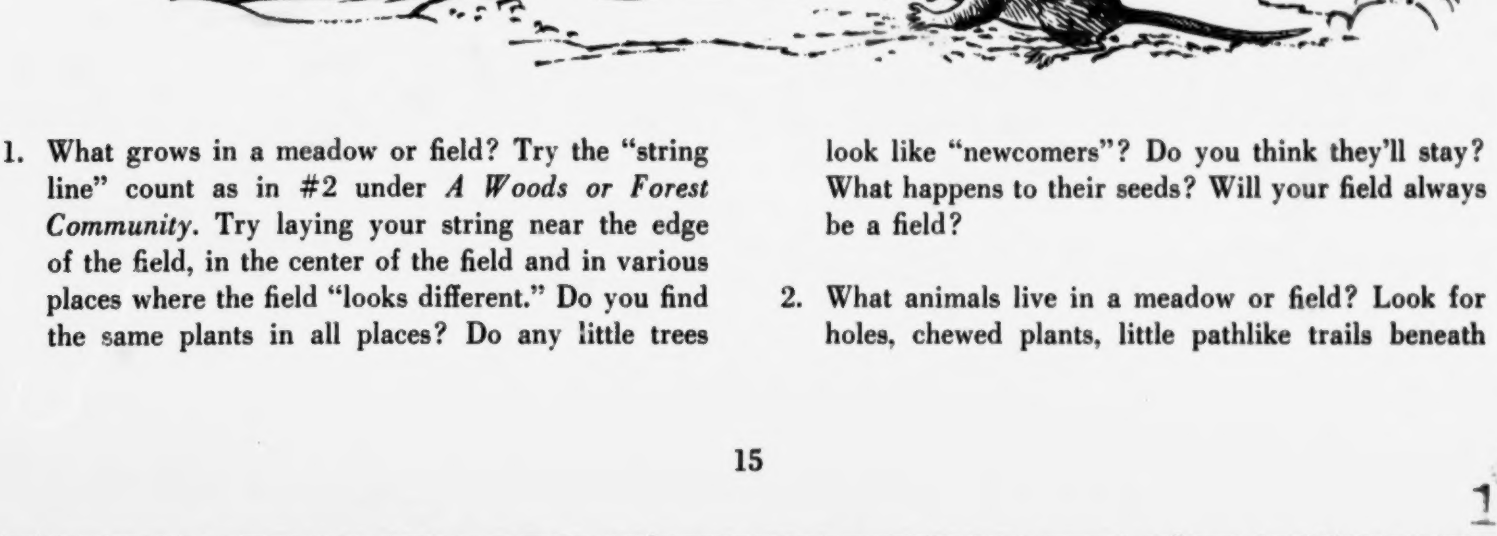
   b. always staying underground.

   c. sleeping in little shady spots most of the time.

   d. hibernating except during the seasons when there is fairly abundant vegetation. They must have water and food. Investigate the amount of moisture in the stems, leaves, and roots of plants. Discover which animals eat plants and which eat each other. Looking at the animals or pictures of the animals will give you some clues if you look carefully at mouths, claws, the size and shape of their bodies, and their coloring. Remember that animals that are relatively inactive don't need as much to eat as you do. Some animals store food. Also they don't worry about getting fat and can store up food as fat to burn when food is scarce. They must reproduce *rapidly* so some of their kind will continue to survive. Read up on how many families a year rabbits, mice, and other rodents can have. Find out about the size of the families that the beach and desert animals have. Remember that there are only so many places to live and so many plants to eat and so many of one kind of animal to eat so many of another kind of animal. If one kind of animal eats too many of a second kind of animal, there will be too few of a second kind of animal to eat enough of a third kind of animal and too many of a third kind of animal will be a problem. If you reverse the steps in the preceding sentence you will still have a problem, so don't bother.



A MEADOW OR FIELD COMMUNITY



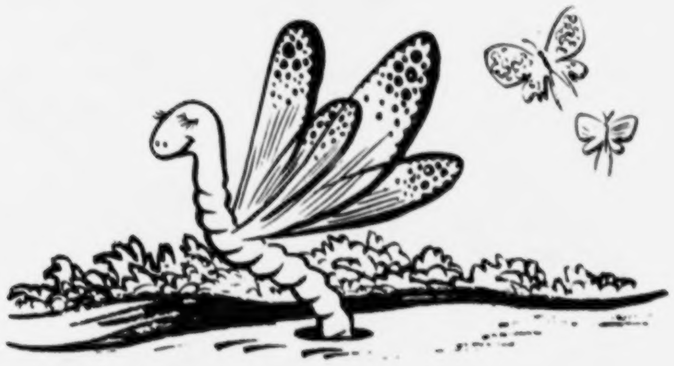
1. What grows in a meadow or field? Try the "string line" count as in #2 under *A Woods or Forest Community*. Try laying your string near the edge of the field, in the center of the field and in various places where the field "looks different." Do you find the same plants in all places? Do any little trees look like "newcomers"? Do you think they'll stay? What happens to their seeds? Will your field always be a field?

2. What animals live in a meadow or field? Look for holes, chewed plants, little pathlike trails beneath

the grasses or weeds, mounds in the soil surface. Listen for birds. Visit the field or meadow just after sunset, sit quietly, look and listen.

Sweep away with an insect net. Sweep high and count your catch, sweep low and see if you don't catch more. On a windy day little insects stay near the ground to escape some of the wind. Dig up a square foot of soil, sieve it onto a cloth and look for insects, and worms. Will any of what you find ever fly?

3. How does the climate affect the field? See if it is windier and warmer out in the field than in a sheltered spot.



4. How do the plants, soil, climate and animals help or harm each other? Watch for:
   animals eating plants
   animals hiding in plants
   animals eating animals
   animals fertilizing the soil (droppings and decaying animals)
   plants feeding the soil (decaying plant material)
   the soil feeding plants (plants growing)

Take a look at some of the plant roots to see how far they go for food. Do you think grass roots hold the soil in place? Dig some grass and see how hard it is to shake all the soil off. Watch for:
   animals seeking cover from rain and wind.
   animals drinking from puddles or "sunbathing"
   people like you enjoying the plants and animals, the sun and maybe even the rain.

A SWAMP OR BOG COMMUNITY

1. What makes a swamp "swampy" or a bog boggy? Maybe you'll answer "water." Where does the water come from and where does it go?

2. What kinds of plants grow in the bog or swamp? Look for the sky and maybe you'll see green gloom made by wet-ground trees shutting out the light. Maybe you'll see lots of sky because there are no tall plants. Feel the clutch of briars and twigs of tangled thickets in some swamps and bogs. Look at the mosses and clumps of grass that trap soil and make bumps on the ground. Isn't the green or yellowish scum lovely? That scum is lots of little plants.

3. What is the soil like? Mucky, oozy and black, no doubt. Try shaking some in a jar of water to see if the particles are so fine that they don't sink. Look at some of the rotting plant material. What color is it? Does this give you a clue why soil is so black?

4. What kinds of animals are in the swamp? Relax and play you are an idling animal. Look at nothing in

particular and soon you will find that any movement or unfamiliar shape anywhere nearby will attract attention. If you can't relax plod along and look for rotting logs that are easily pulled apart. Pull away and you'll find many little insects and grubs. Search the soft mud for prints. Look for piles of shells or bones on little patches of high ground. Who ate whom? Under the mass of tangled vegetation down close to the ground, look for a honey-combed maze of winding, tunnel-like passages. Who uses these? See any signs of digging around rotted stumps or under the roots of plants?

5. How do the animals and plants depend on each other and their surrounding?
   If you were a turtle
   where would you look for food?
   where would you hide from humans?
   Now be a possum.
   When you hunt at night, where do you hide from the owl that is hunting you? How do your short legs and pointed shape help you in underbrush?
   If you were a plant with seeds to scatter how can the water help transport seeds? How do animals help?
   If you were a frog who'd laid a thousand eggs would you have a problem? Remember if all of them hatch, there won't be enough frog food or frog homes for all. Who helps out by eating your eggs? Remember also that if all of your eggs are eaten there won't be any more frogs. Who helps out by eating the eaters of your eggs? But you're still you. Go home and put on some dry shoes. Could you live easily in a swamp? Why not?

A CITY OR TOWN COMMUNITY

1. Where is your city or town? You can find it on a map, but then go out and really look to see if it's on low ground, on hills, on mountains, near a sea, river, lake, desert. Is it spread out so that parts touch other cities or towns? Are all the parts alike? Have a city or town hike and really look at where you live. Note old buildings and new buildings. What were they built for? Your Chamber of Commerce, historical society or elderly acquaintances can help you find answers.

2. How did your town get to be a town? Of course people kept coming but why did they come? Look for natural resources that might have drawn the people. Is there ore, lumber or building material nearby? Water for power, transportation, or use by industries? Fishing waters, good farmland or grazing land? Is the town in a good location to receive and send goods to other cities or towns? Visit the railroad yard or the ports. Obtain a highway map from a service station and see what and how many roads connect your town with others.

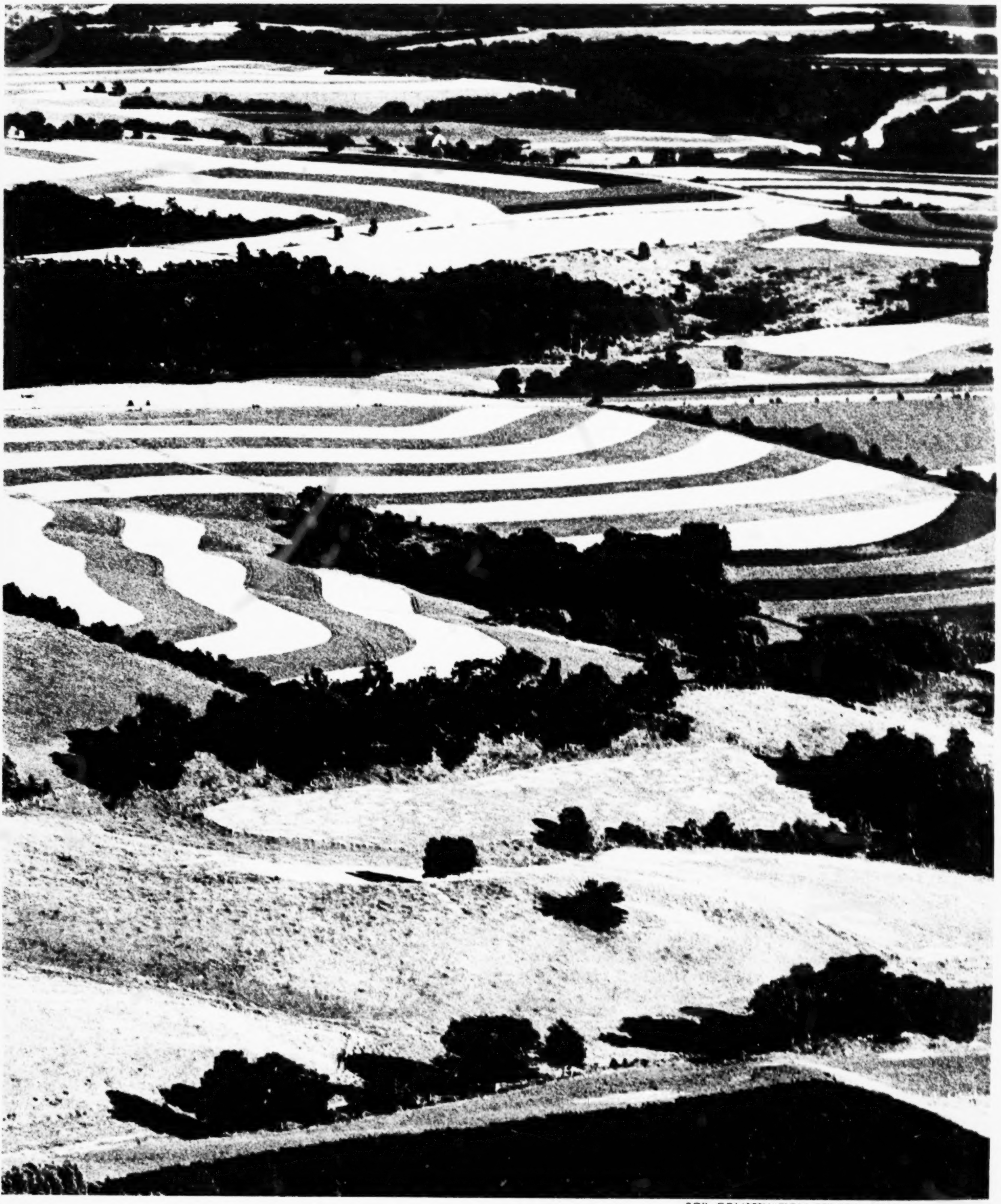
3. What are the industries in your town? Walk around and take a look. Ask your Chamber of Commerce or other informed citizens which industries are most important because of the quantity or the specialized project they produce, the number of people they employ, the service they provide.

4. What natural resources do these industries use? Take a tour to observe processing steps, quiz someone from the industry; examine the product for clues to the resources needed.

5. What are the institutions in your city or town that are important human resources? Think about the services offered by schools, churches, libraries, museums, social agencies, etc.

6. What is city or town planning? Visit a planner's office and ask to see a planner's map of your town and any plans for the future. Does your town have any of these planner's problems:
   traffic, water, residences or industries on flood plains, pressures from citizens to place fill in marsh or swamp areas, inadequate space, zoning for different income groups, inadequate play space?

7. Make a little sketch of the placement of buildings, roads, play space, etc., that you use in a day. Is there any little space that you could replan for greater use? Your room or yard is a good starting point.



SOIL CONSERVATION SERVICE—USDA

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introduction

I do not own an inch of land,
But all I see is mine.
Alice Cary

SOIL AND LAND

Definition: Soil is the surface layer of mineral particles and organic matter.
Land is the surface in a special sense.

Here are some things to know and remember about Soil and Land.

Soil is formed from rocks by geological erosion.

Soil is formed continuously over a long period of time by natural forces.

Soil is formed in layers that differ in texture, organic content, structure, water-holding capacity and fertility.

Soil is a reservoir that holds water.

Physical, chemical and biological processes make plant nutrients in the soil.

Soil is eroded by wind and water.

The erosibility of soil is determined by texture, slope, moisture content, and cover.

The soil is held in place by trees, shrubs, grasses and other plants.

Good agricultural land is taken out of production for man's other needs.

Irrigation, drainage and forest removal bring new lands into agricultural production.

Man both accelerates and retards the erosion of the soil.

Man both destroys and builds up fertility in the soil.

The welfare of people is affected by the way the land is used.

The characteristics of each acre of land may be different and they influence what its use should be and what protection it needs.

When man learns to manage the soil correctly, it can be passed to future generations unharmed or improved.

Soil, water, wildlife and vegetation are interdependent and all are essential to the well-being of man.

Man uses zoning and planning methods to define and adjust to proper land use.

Control of erosion is more effective when landowners work together.

The projects that follow will help to illustrate and develop these points and give the girls a better understanding of Soil and Land.

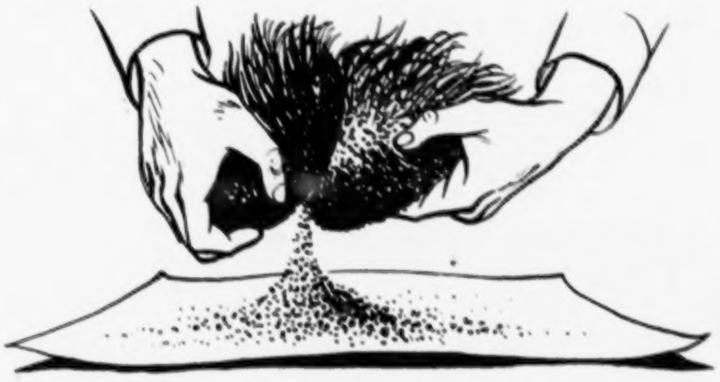
SOIL AND LAND

FORMATION OF SOIL FROM ROCKS

Purpose: To see that soil can come from rocks.
Site: Ledge of limestone or other easily eroded rock.
Procedure: Visit a limestone ledge and examine the materials which have accumulated at the bottom. Also examine the materials in the crevices and between layers of rock. What is this material? How was it produced?

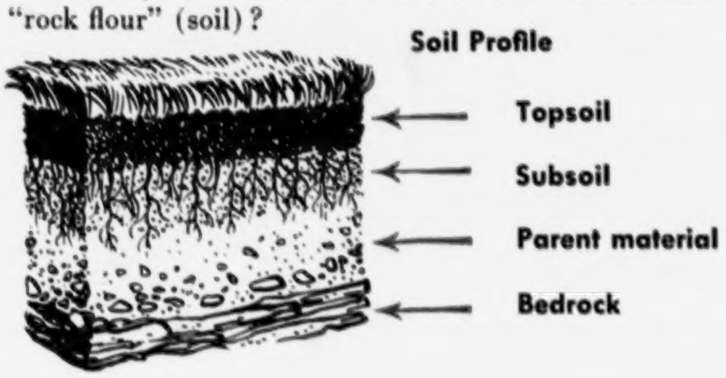
NATURE BREAKS UP ROCKS

Purpose: To understand how natural forces break up rocks.
Site: Any place you can find rocks.
Procedure: To help understand how rocks are split apart and divided into particles: (1) Crush pieces of limestone or other rocks together or between pieces of harder rock. Limestone burned in campfires is brittle and easily broken as a result of heat. Note also the effect of molding a handful of clay and allowing it to freeze.



HOW SOILS ARE MADE

Purpose: To learn something about how soils are made.
Site: Quarry, roadcut, etc.
Procedure: Visit a quarry, cutbank, or other area where rock layers are exposed. What is the geologic story of these layers? What natural forces turn the rock into "rock flour" (soil)?

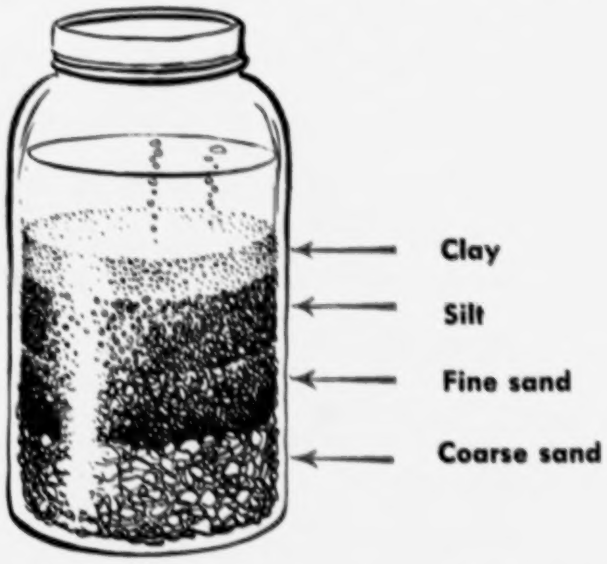


A SOIL PROFILE

Purpose: To learn something about a soil profile (a sideview of the different layers).
Site: Roadcut, gully, trench, etc.
Procedure: Examine a soil profile and identify the different layers (horizons).

SEPARATION OF SOIL PARTICLES BY WATER

Purpose: To learn how water separates soil particles of different size, and how it may be lost when topsoil erodes.
Site: Anywhere you can locate three different kinds of soil.
Procedure: Select three contrasting samples of soil: one sandy, one clayey, and one dark loam. Put enough of each kind in a straight-sided narrow glass or tumbler to make a 2- or 3-inch column of soil and fill with water (a small amount of ammonia added will help break up the soil granules). Cork or cover the cylinder tightly and shake vigorously for several minutes until the lumps or granules are thoroughly broken up. Some gas may be evolved during the shaking. When adequately shaken, release the cover momentarily to let gas escape and then seal the top firmly. Quickly invert the cylinder or flask and set in a rack or other support where it will remain undisturbed. Let settle several days, then examine it. Where is the gravel in each sample? The sand? The fine clay or silt? Do all three samples contain some of each kind of soil? When a stream's velocity is slowed down (as represented by settling in the experiment), what kind of material will be dropped (deposited) first?



WATER-DEPOSITED SOIL

Purpose: To see that water can carry and sort soil particles.

Site: Ditch, bottom of hill, gully, etc.

Procedure: Find a place in which soil has been deposited by water in a ditch or at the bottom of a hill. Is the soil usually coarse or fine? Is there any relation between the steepness of slope and size of particles deposited. Why are fine particles most likely to be carried away?

COMPARISON OF WEIGHTS OF SOIL

Purpose: To see that different soils weigh different amounts.

Site: From any place you can, collect three kinds of soil.

Procedure: Compare the weights of equal volumes of sand, clay, and loam. How do the three compare in weight? Why?

EVAPORATION AND INFILTRATION

Purpose: To see that rainwater is a "fugitive" resource.

Site: Your yard and neighborhood.

Procedure: After a rainfall, notice the small pools of water that stand in the fields and roads. Notice also that this water gradually disappears. What two things happen to this water?

PERCOLATION

Purpose: To see how water moves through different kinds of soil.

Site: Area with two different kinds of soil.

Procedure: Take four glass containers of equal size and shape. Fill one with sand, one with gravel, one with clay, one with loam. Leave about one inch of space in the container above samples. Fill space with water. Note upward movement of air (bubbles). Add water until soil is saturated to bottom of container. Which soil permits air and water to move through it most rapidly? In which soil does percolation (downward movement of water) proceed most slowly? What is relation between size of soil particles and rate of percolation?

THE SOIL RESERVOIR

Purpose: To see how different soils hold different amounts of water.

Site: Any woodland and any field.

Procedure: Fill a quart jar (or gallon can) with woodland topsoil rich in humus. Fill another quart jar with any ordinary cultivated or fully-exposed soil. Slowly fill both jars to the brim with water, measuring the amount poured into each jar. Which required the most water? Let stand at least two hours. Now pour off the excess water from each into a container for measurement. Which kind of soil absorbed the higher percent of water?

EFFECT OF CULTIVATION AND ABSORPTION OF WATER

Purpose: To see how cultivation alters the amount of water soil can absorb.

Site: A small grassy spot.

Procedure: Remove the grass from two spots close together, each two feet square. Loosen the soil in one square with a spade or hoe. Leave the other intact. Sprinkle equal amounts of water on both squares. Which will absorb the most water? Note any "puddling effects."

VALUE OF TOPSOIL

Purpose: To show the difference of plant growth in topsoil and subsoil.

Equipment: Two boxes, one filled with good topsoil, the other filled with subsoil taken from a field where all the topsoil has been washed away (or from soil layer below topsoil). Plant seeds and observe their appearance and rate of growth.

MOISTURE OUTPUT OF PLANTS

Purpose: To prove that plants release moisture.

Site: Your group meeting room or home.

Procedure: Grow a plant in a pot or jar. When the plant is four or five inches tall, place a test tube or glass jar over it. After a few hours, notice the moisture on the inside of the jar. This process of water loss by plants is known as transpiration.

VALUE OF TOPSOIL

Purpose: To see why topsoil is necessary for plant growth.

Site: Anywhere topsoil and subsoil can be obtained.

Procedure: Sow seeds under similar conditions in rich, dark-colored topsoil, in clean sand, and in clay subsoil (hardpan). Label each. Place in sunlight, water regularly, and observe results until plants are full-grown. Show value of fertility, how it may be lost when topsoil erodes.

EFFECT OF CULTIVATION ON SOIL

Purpose: To see how cultivation changes the soil structure.

Site: An eroded field and a field in its natural condition.

Procedure: Bring to a meeting samples of soil from a badly-eroded field and from a field that has never been cultivated. Compare the samples as to size, relative amount of particles of different sizes and arrangement of particles (free or stuck together), and color. Which is darker? Take weight-volumes of the samples. Which is heavier? Why? (Be sure both samples are thoroughly dry. Dry in pans in the sun or on radiator but do not handle more than necessary.)

EFFECT OF CULTIVATION ON EVAPORATION

Purpose: To see how cultivation alters the rate and amount of evaporation from the soil.

Site: A small piece of ground.

Procedure: Using a spade or hoe, loosen the soil in two spots about two feet square. Leave one square cloddy and carefully pulverize the other until the surface is covered with finely-divided soil. After two or three days in which there has been no rain, examine the two squares. Which is more moist? Why?

THE FOREST FLOOR

Purpose: To learn something about the forest floor and its ability to absorb and retain water.

Site: An ungrazed woodlot or a fenced plantation of pine.

Procedure: First note how easy the forest floor is to walk on and the "spring" it gives to your step. Examine the forest floor to find the reason for this. Is the top layer composed of hard-packed soil or of partly-decayed leaves and twigs? Take a handful of this top material and squeeze it. When you let go, does it assume its original shape? Can you explain what happens? If the soil is wet, see whether you can squeeze water out of it. Does this demonstration help you to explain why it is recommended that trees be planted on the headwater of streams, around reservoirs, and on high farm land?

TREES SUPPLY THEIR OWN FOOD

Purpose: To find what happens to leaves in the forest floor.

Site: A woodlot of mixed hardwoods.

Procedure: Rake away some of the leaves that fell most recently. What do you find underneath them? What caused these to be skeletonized? Dig a little further and see whether you can find any earthworm holes. Earthworms eat the leaves and help return the plant food to the soil.

COMPARISON OF SOILS

Purpose: To see how the soil under the trees with needle leaves differs from soil under the trees with broad leaves.

Site: Abundant pine, hemlock or fir woods and woods with broad-leaf trees.

Procedures: Visit well-stocked coniferous (needle-leaf) and deciduous (broad-leaf) stands of timber on the same day in the same general area.

1. In which does the soil seem to feel coarser? Darker colored? Heavier? In which does the humus layer seem to grade more gradually into the mineral soil? Take two cupfuls of each type of soil (excluding coarse bits of litter), put in a quart jar, fill with water, shake well, let stand overnight. Which seems to contain the most humus? (Floating layer and dark top layer.)

2. What is the average depth of forest floor (litter plus dark organic layer) above mineral soil in each type?

3. Which soil seems to be more moist at the same depths?

4. Which type seems to have more tree reproduction and undergrowth?

YOUR COMMUNITY'S SOIL

Purpose: To learn about soil in your community.

Site: Your community.

Procedure: Find out about different kinds of soil in your community. Local garden clubs, nurseries and agricultural experiment stations can help. How did or does the soil affect the planning for the different uses of areas in your community?

ANIMALS AND SOIL FORMATION

Purpose: To see how animals alter the soil.

Site: Yards, vacant lots, deserts, woods, fields, etc.

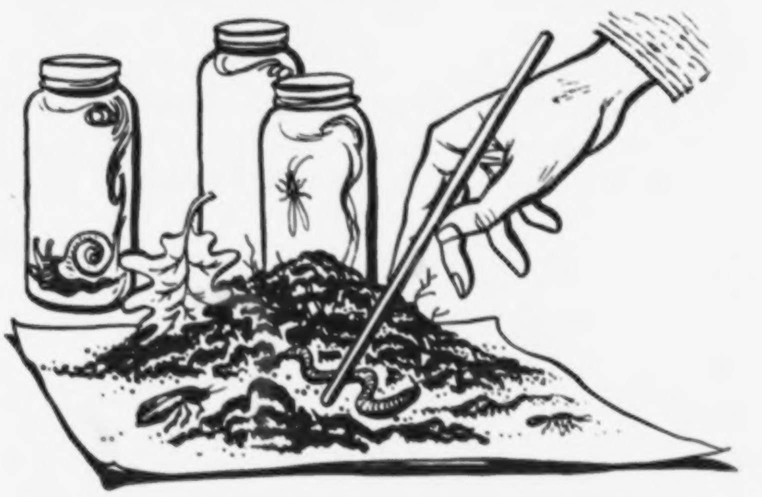
Procedure: Notice the holes in the ground made by ground squirrels, woodchucks and other animals. Notice also the mounds of dirt near these holes. Find a large ant hill and examine the soil that has been brought to the surface of the ground. In the spring and fall find evidences of the work of earthworms. What do you find at the mouth of each hole? What do these observations indicate concerning the activities of animals in bringing substance to the surface?

LIFE IN A ROTTING LOG

Purpose: To see how plants and animals benefit from and contribute to the process of decay.

Site: Area in which there is rotting log.

Procedure: Tabulate and total the kind of organisms found. In addition, the depth of the humus around and beneath the log should be noted, and the approximate depth of appreciable moisture.



ANT HILL ACTIVITIES AND DEFENSE

Purpose: To see how ant activities affect other organisms and the soil.

Site: Area with ant hill.

Purpose: Find an ant hill, preferably of good size. Disturb the top slightly and watch the ants investigate and repair the disturbed section. Usually, the ants will bring eggs and pupae to the surface and carry them down to other, deeper galleries. Throw a worm onto the hill and watch the ants' teamwork in destroying the invader. Occasionally, it will be possible to watch ants obtaining honeydew from aphids on leaves ("milking their cows"). What do ants do for the soil?

ORIGIN AND USE OF CLAY

Purpose: To learn something about origin and usable properties of clay.

Site: Area with clay.

Procedure: Search for usable clay or earth deposits. From evidence found, determine probable origin of the clay. (Some clays were formed in place by direct disintegration of rock, others were laid down as bedded deposits.)

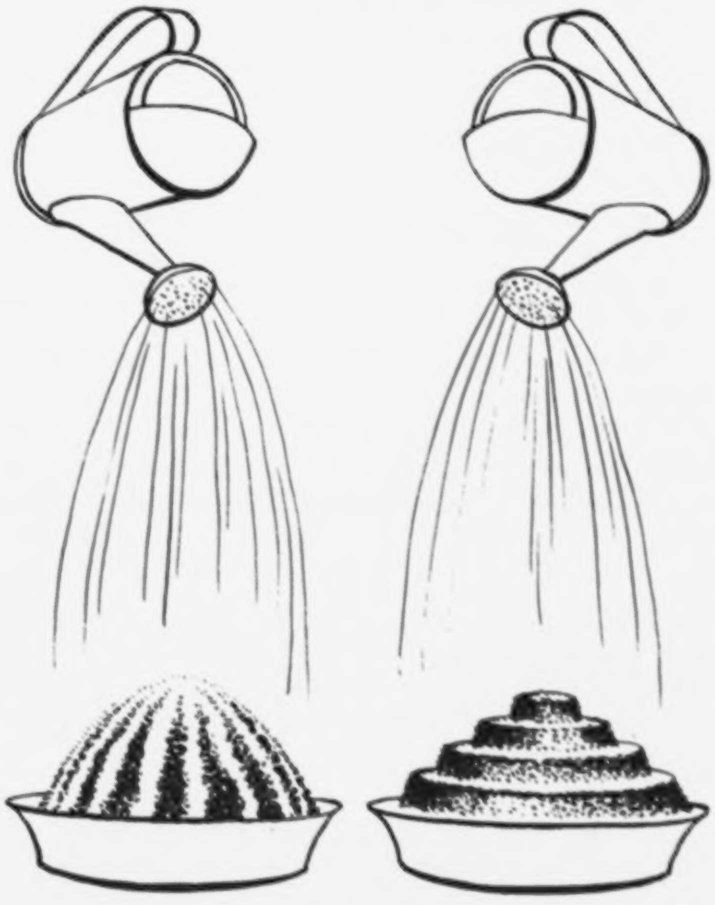
Use clay thus acquired in craft and nature activities such as: (1) modeling animals, particularly those observed in the camp vicinity; (2) molds for casting natural objects in plaster, e.g., leaves, cones, fruits, snail shells, box turtle shells, etc.; (3) clay plaques with leaf or other impressed design.

HOW STEEP IS THAT HILL?

Purpose: To measure percent of slope. (The steepness of a slope is the vertical increase in height for the horizontal increase in distance.)

Site: Any slope or hill.

Procedure: You need a line level or small carpenter's level and two wooden slats each five feet long. Mark one lath with 100 equal parts and number from 1 to 100. (The distance between each mark will be 1/20 of a foot.) Select the area to be measured and have group guess how steep it is. Then place one end of plain lath on the ground with the line level on it. Raise the other end of the lath until the line level indicates the lath is perfectly horizontal. Stand the marked lath at the raised end of the plain lath. The point where the two laths cross indicates the percent of slope. Select other areas of varying steepness for additional measurements.



VALUE OF CONTOUR TILLAGE

Purpose: To show advantages of contour farming.

Site: Anywhere.

Procedure: (1) Hold washboard nearly flat with ridges horizontal and pour on water. Explain that this illustrates the water-holding capacity of contour plowed furrows and implement marks. (2) Next, tilt the washboard slightly to show the effects of rows that are not quite on the contour. (3) Hold board at steeper angle but with ridges again horizontal and pour on the water.

This illustrates the decreased water-holding capacity of contour rows on steeper slopes. Point out that steeper slopes require more than contour tillage to prevent erosion. (4) Hold board at gentle angle with ridges vertical and pour on water. Explain that this represents up-and-down tillage which wastes moisture and invites erosion.

VALUE OF WOODLAND SOIL OR SOD

Purpose: To see the value of woodland soil or sod in reducing erosion.

Site: Anywhere with bare soil and woodland soil or sod.

Procedure: Outdoors, on a *gentle* slope, sprinkle water slowly on (1) bare soil and (2) woodland soil. (Use lawn sod as a substitute if woodland soil is not available.) Which soil absorbs the most water? What does the force of water do to each kind of soil? Repeat, *pouring* the water. Answer the same questions. Repeat both steps again, this time with a *steep* slope. This makes an effective experiment particularly if arranged with a method of catching and measuring the runoff.

VALUE OF ORGANIC MATTER IN SOIL

Purpose: To see how organic matter retains good soil structure.

Site: Anywhere soils with high and low organic matter can be obtained.

Procedure: In shallow dishes, place wet samples of two different soils, one low in organic matter and the other high. Dry out thoroughly. What is the effect on each?

THERE ARE DIFFERENT KINDS OF EROSION

Purpose: To learn something about different kinds of erosion.

Site: Anywhere erosion is evident.

Procedure: Photograph or make a sketch or sketches of one form of erosion: (sheet erosion, gully erosion, wind erosion, streambank erosion). Give a method for controlling each of the above types of erosion.

TRAPPERS OF SOIL

Purpose: To show how plants hold soil.

Site: Vacant lot, field, or yard, and area with uprooted tree or exposed roots.

Procedure: (1) Pull up some weeds from dry and moist location. Examine and compare root structures. Weeds growing close together will show interlocking of roots. (2) Dig up a well-developed dandelion plant growing in a dry location to illustrate taproot. (3) Try to remove the dirt from a piece of dense sod by shaking it and then by running water over it to show how earth clings to the roots. (4) Examine tree roots by noting wind-thrown trees, or roots exposed in roadbuilding or as a result of removing stumps.

BEAUTY FROM PROTECTED SOIL

Purpose: To protect soil from erosion and beautify an area.

Site: Yard, schoolyard, etc.

Procedure: Plant grass seed on bare ground in yard, schoolyard, churchyard to prevent erosion. Offer your services to help maintain grass and landscaping.

DEGREES OF SHADE

Purpose: To learn something about the effect of vegetation on amount of light reaching soil.

Site: Wooded area, open cultivation, brush cover.

Procedure: Obtain a photographer's light meter. Take soil-surface readings in smaller interior openings at shaded edge of woodland, and on open ground. Obtain readings in both coniferous and deciduous types, if possible, and compare. Compare light readings from cultivated field, shade of shrub or brush cover, shade of young, partially-open woods and shade of dense woods.

WINTER WATER STORAGE

Purpose: In mid-winter determine depth to which sod is frozen in the open and in the interior of a woodland. Save this record. In early spring when snow disappears from the open, measure depth of snow in interior of the woodland. What influence do these two factors have on possible spring floods?

TWO-DIMENSIONAL MAP

Purpose: To learn fundamentals of mapping.

Site: Anywhere.

Procedure: The first step in making any map should involve pacing distances, direction finding by use of the compass, and recording the results on paper. Indicate by drawings, the outstanding landmarks, woods, fields, etc.

SEMI-PERMANENT MAP

Purpose: To become familiar with topographic and other features of area.

Site: Anywhere.

Procedure: Construct map of clay, sand, mosses, twigs, etc., using no cardboard backing.

PERMANENT MAP

Purpose: To construct a permanent topographic map for display or use in planning.
Site: Anywhere.
Procedure: (1) Obtain topographic map of area or make one. (2) Cut cardboard (corrugated) to same contours as on map. Place one on top of the other in proper sequence and position. Glue if desired. (3) Fill in between pieces of cardboard with papier-mâché, plaster of Paris or native clay. Don't use too much clay so that the same general contours can be kept. (4) Color with paint and use green-colored bits of sponge for trees. Paint the forest dark green, fields light green, and water blue.

STRAIGHT FROM THE HORSE'S MOUTH

Purpose: To learn something about farm conservation practices and how the farmer learns about the practices.
Site: Farm or ranch.
Procedure: Visit a farm or ranch and ask farmer or rancher to explain the conservation practices he uses and to tell you how he learned about the various practices.

SOIL CONSERVATIONIST

Purpose: To learn something about the method and value of some soil-conservation practices.
Site: Any farm or ranch field.
Procedure: Help to lay out a field for contour ploughing or strip-croppings.

HOW MUCH DO THEY EAT?

Purpose: To learn something about the measurement of grazing land for its capacity to support livestock.
Site: Any grazing area.
Procedure: Help a grazing officer make a survey.

SAFE, PLEASANT ROADSIDES

Purpose: To improve a roadside.
Site: Highways and byways across the country.
Procedure: Carry out a roadside improvement project. Plant trees or shrubs, seed with grass, remove debris, fire hazards, etc. Cooperate with city, county, and state supervisory and road officials.

LADY LANDSCAPERS

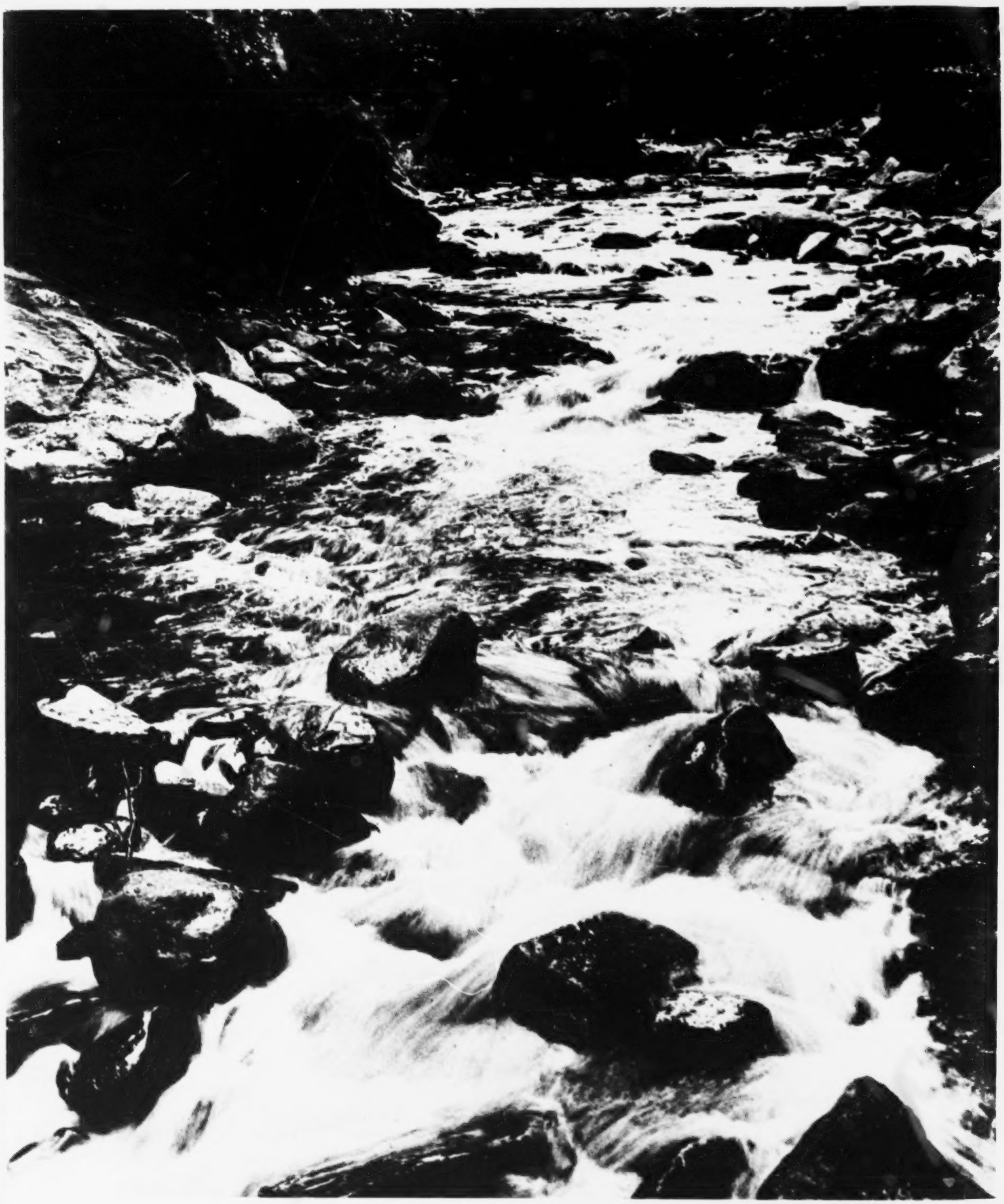
Purpose: To improve yards or parks for your use and for wildlife.
Site: Any yard or park.
Procedure: Plant seedlings in yard or park for shade, ground cover or landscaping. Ask for advice from city highway and park departments or city planners or landscape engineers. Plant shrubs that provide food or cover for wildlife in yard or park. Local Audubon clubs can assist in choice of species.

COMMUNITY SERVICE LANDSCAPING

Purpose: To provide community service by improving church or school grounds through good land use.
Site: Any church or school, etc.
Procedure: Carry out a project of helping to landscape the school ground, churchyard, etc. (Cooperate with school authorities, planners, conservation clubs.) Offer your services to help maintain grass and landscaping.

RECLAMATION

Purpose: To reclaim land by improving fertility of soil and curbing erosion.
Site: Strip mine spoil banks or similar areas. (Spoil banks are the piles of soil and rock rubble that have been stripped off the beds of coal or mineral ores.)
Procedure: Plant spoil banks and similar areas to help reclaim land. Set up a picture display story showing banks at different stages of reclamation. Is there a law requiring mining companies to reclaim land? What, if any, is penalty for not reclaiming land?



UNDERWOOD & UNDERWOOD

introduction

Water is the prodigal
  of hydrogen and oxygen
Ever wandering, moving on.
Anonymous

WATER

Definition: *Water is the liquid which descends from the clouds in rain, hail and snow, and which forms streams, rivers, lakes and oceans.*

Here are some things to know and remember about Water.

Water can change in form with relative ease, but is never destroyed.

Water supply is often not sufficient to meet the demand for water.

Water responds to gravity.

Water is not easily moved from its source for use in a different locale.

Water is a fugitive resource.

Water is variable in quality.

Through the process of evaporation and precipitation water returns to us.

The distribution and supply of water influenced where man wandered and settled.

Water is essential to living things.

Soil, plant and animal life are interrelated with water.

The availability of water and the uses to which it may be put vary with the locality.

The supply and availability of water at any given point are variable and may become uncertain.

Quantity and quality of water determine how man shall use it.

Property rights to the ownership and use of water have unusual characteristics and are different in various sections of our country.

Better use of water requires planning.

Conflict over water use produces competition for its use.

Water that is properly managed can give varied and repeated services:

To produce energy • provide recreation • transport waste • meet domestic and municipal needs • grow food • process food • supply manufacturers increased demands • facilitate increasing navigation and transportation

The projects that follow will help to illustrate and develop these points and give the girls a better understanding of Water.

WATER

OCEANS AND SEAS

Purpose: To learn about the size and location of some water resources.

Site: Your library.

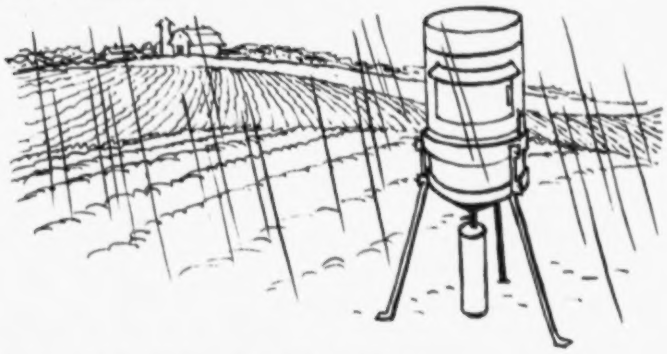
Procedure: Locate on a map the major oceans and seas of the world and compare the size of land and water areas of the world; do the same for your state, your county, township, etc.

RAINFALL IN THE WORLD

Purpose: To learn something about the amount of water resources in the form of rain.

Site: Your library, weather station, etc.

Procedure: Find out what regions of the world have the heaviest and the lightest rainfall. What are the reasons for difference? How does rainfall in your area compare to areas of highest and lowest rainfall? Visit a weather station and learn how rainfall is measured. Construct a simple rain gauge and measure the next heavy rainfall.



IMPORTANCE OF WATER

Purpose: To become aware of the importance of water.

Site: Your home and community.

Procedure: Discuss the ways you use water, for example: drinking, swimming, washing, gardening, etc. Walk around your community and note other ways water is used. For example, navigation, manufacturing, power, etc. What would you say about the importance of water?

EQUIVALENT DEPTHS OF SNOW AND RAIN

Purpose: To observe the amount of water contributed by snow.

Site: Yard, porch, etc.

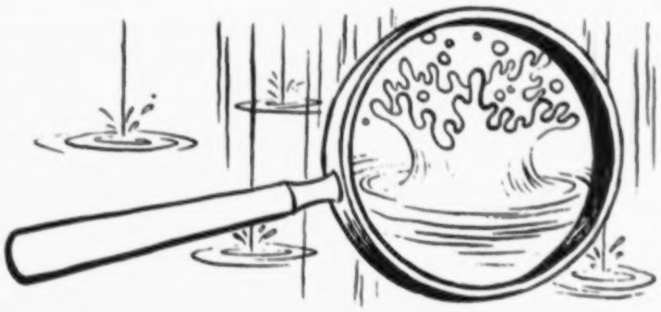
Procedure: Fill pail with snow and measure depth of pail. Melt the snow and measure the depth of water formed. What is the ratio between depth of snow and depth of water?

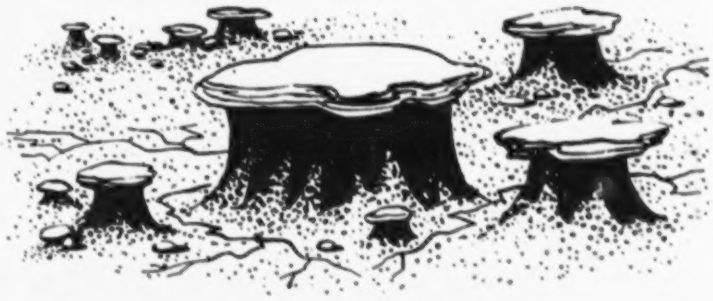
EVAPORATION

Purpose: To see how vegetation or buildings can affect rainfall and evaporation.

Site: Tree with no undergrowth, tree with undergrowth, open yard, field or porch. This could also be done in the city by placing pans on open roofs, near the base of buildings, in alleys, etc.

Procedure: Place cake pans (1) under a tree with no shrubs under it, (2) under shrubs growing under trees, (3) in an open area. After a rain which pan has the most water? Leave the pans with water in them for several days. From which pans does the water evaporate most rapidly?





VEGETATION AND SPLASH EROSION

Purpose: To see how soil cover cuts down on the amount of splash erosion (displacement of soil particles by the impact and splash-up of falling water).

Site: Any open bare piece of ground or a garden flat of soil placed in open.

Procedure: Place bits of flat rock or bottle caps on bare soil in an open area. After a heavy downpour, examine the soil around the caps. Does the soil surface on which the caps are, appear to be higher than the surface of the soil around the caps?

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PLANTS, RAINDROPS AND SOIL

Purpose: To investigate the effect of plants on the erosive power of rain.

Site: Any place where you can watch raindrops hit a surface.

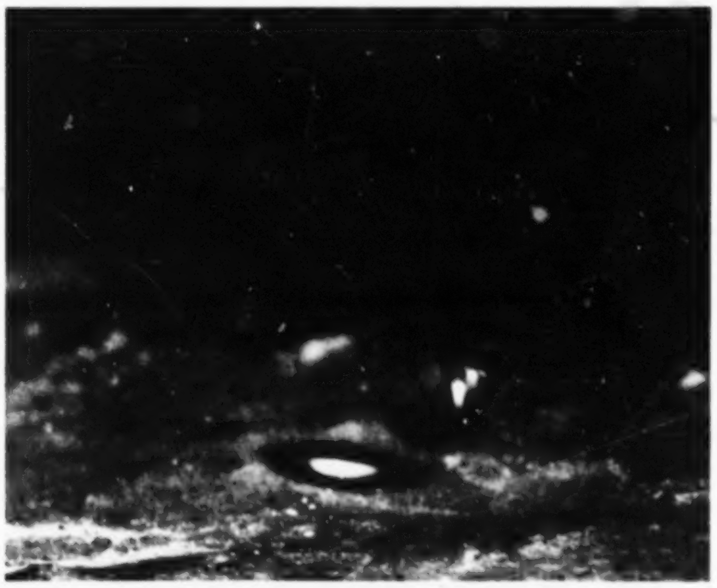
Procedure: Watch raindrops that have hit leaves, windowpanes, etc. See how little drops join to make big drops. When big drops hit the ground, do you think they would displace more soil or less soil than little drops? Would the height from which a drop fell make any difference on the force of a drop? How could plants affect the height a drop fell?

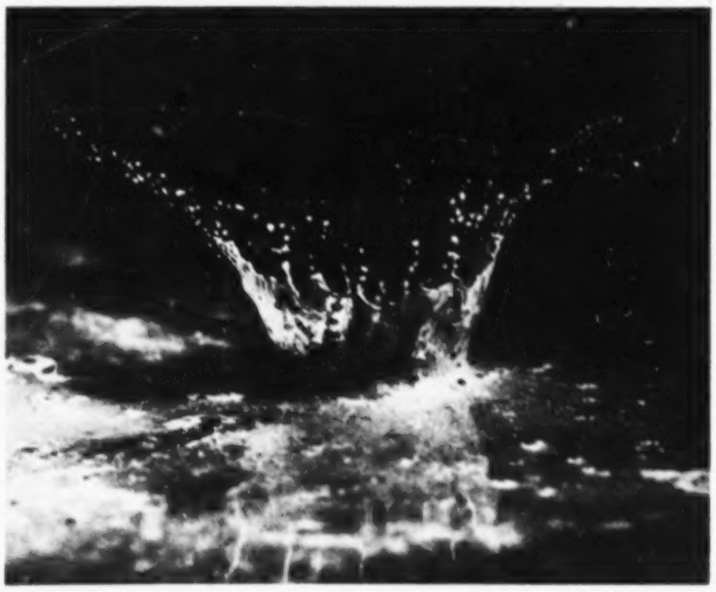
—SLOWED DOWN

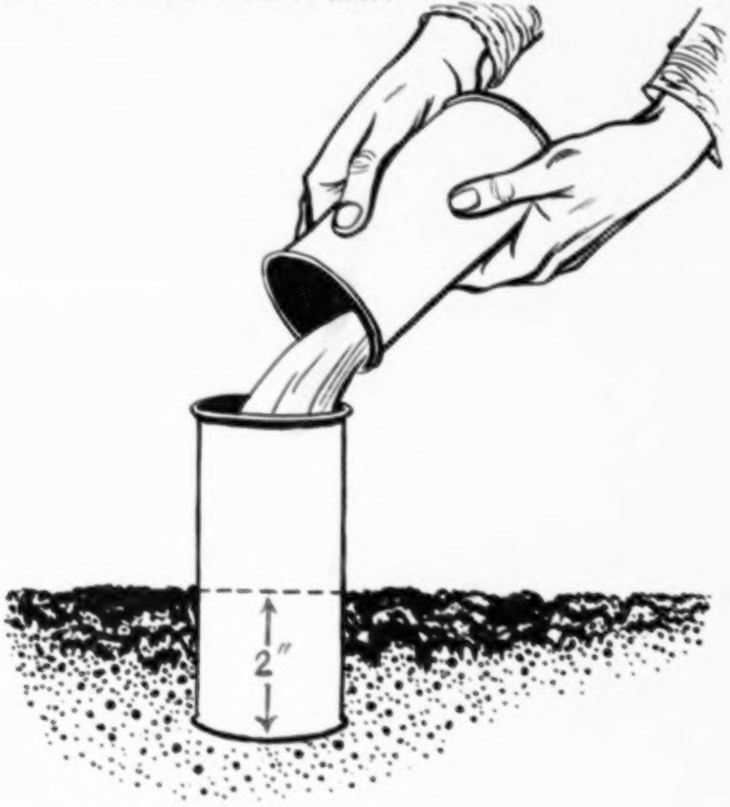
Purpose: To see how vegetation may affect the rate at which water moves into the ground.

Site: Yards, beaches, fields, wooded area, etc.

Procedure: Take #10 tin cans. Cut out the top and bottom. Pound the can into the ground in one of several places such as under trees, in fields, on a beach, next to walks where people "cut corners." Pour two quarts of water into the can in each spot where you sink a can. Count the number of seconds or minutes it takes for all the water to disappear into the ground. Are there differences in time? What do you think are the reasons for any differences? Scrape away the litter or vegetation on top of the soil and try this experiment again. Does it take the same amount of time?







WHICH WAY DOES IT GO?

Purpose: To see the direction water moves in the soil.

Site: Your yard.

Procedure: When the soil is dry sink a pipe or funnel neck several inches into the ground. Slowly pour a gallon or so of water into the opening above ground. After the water has all disappeared, pull out the pipe or funnel, wait a few minutes and then dig up the area. What direction did the water move after it got into the soil? Did it all go straight down? Did some of it go sideways? How far down do you think it will go? If it were to hit rock or hard soil that it would not run through, where would the water go?

HOW DO STREAMS START?

Purpose: To see how a stream starts.

Site: Along a stream.

Procedure: Follow a small stream to its source, and see where it originates. Streams rise either as springs, in swamps or in a farm tile drainage system.

SPECIAL TRIPS

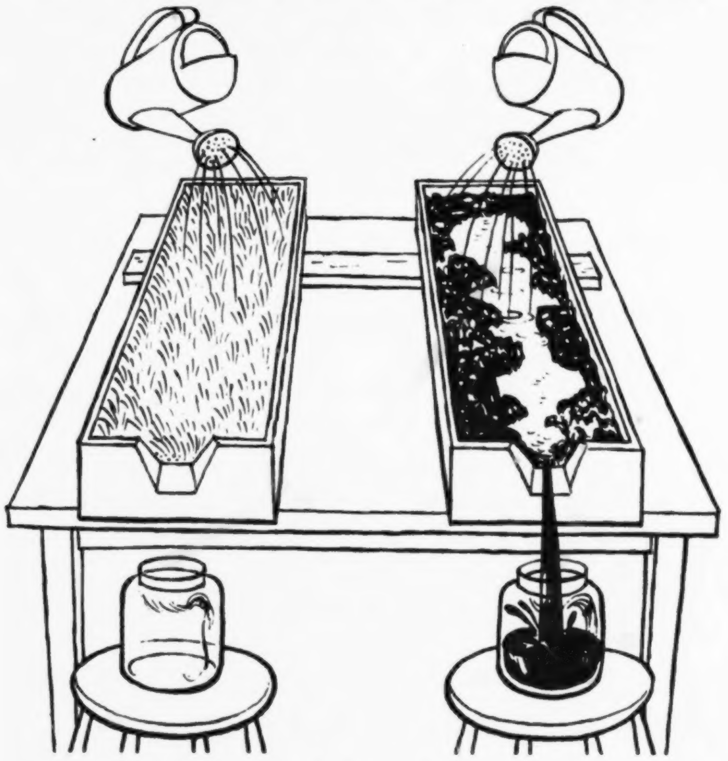
Purpose: To observe erosion.
Site: Your community or surrounding countryside.
Procedure: A hard rainstorm, a flash flood, or a flood caused by a spring thaw will give you a chance to take a trip to see erosion in action, with gullies forming, banks giving way, and streams getting muddy before your eyes.

—WATER CARRIES SOIL

Purpose: To observe how water can carry soil.
Site: Nearby river or stream.
Procedure: Collect water in a quart jar from a river or stream when the water is muddy. Let it settle; observe sediment in bottom. Where did the sediment come from? If sediment was continually deposited in great quantity on the bottom of a lake or reservoir what would happen to the lake or reservoir?

SOD VERSUS BARE SOIL

Purpose: To observe differences in erosion from water running off sod soil and bare soil.
Site: Yard, basement, porch, etc.
Procedure: Take two or more wide boards (24 inches or more). Tilt on equal slopes fairly steep. Construct a sample soil layer on each, at least one being covered with a layer of sod. Pour equal amounts of water on each sample, preferably with sprinkling can or tin can with holes punched. From which sample is the most soil carried away?



UP THROUGH THE SOIL

Purpose: To observe how water moves up in the soil.
Site: Your home or meeting room.
Procedure: Pour a half-inch of water in the bottom of a quart jar. Fill the jar with light-colored dry sand. Watch the dampness spread upward throughout the jar by capillarity. (Capillaries are the little tubes or channels between the sand particles.) Discuss.

EXCURSIONS

Purpose: To learn the effects of water on soil and land.
Site: Your community and surrounding countryside.
Procedure: Observe how: (1) Dripping of water from eaves of barn or garage may start a gully. (2) Furrows plowed up and down slope provide channels in which water can run and cause gullies. (3) Forest litter becomes mixed with any particles of rock and forms forest topsoil. (4) Cowpaths (white lines in the right portion of picture) form heads of gullies in pasture lands.
Study: (1) Dams and plantings in gullies, grassed water ways, contour plowing, strip farming and other erosion-control methods. Observe amount of erosion and try to observe relation between the condition of farms and amount of erosion.
Consider: (1) Condition of house and barn. (2) Condition of farm animals. (3) Repair of fences. (4) Methods of erosion-control and renewal of soil. (5) Amount of pasture land in good condition. (6) Amount of uncontrolled erosion.

WHOSE WATER IS IT?

Purpose: To learn about restrictions on water use.
Site: Your community.
Procedure: What are some of the restrictions on ownership or use of water in your vicinity? If you have a stream, river, etc., on your property, do you own it? Can you use it any way you want? Would girls in all parts of our country answer these questions the same way? Why not? Are there periods of the year when you can't use all the water you wish? What is the reason for limiting use?

—CLEAN, USEFUL WATER?

Purpose: To learn about the source and condition of water in creeks and reservoirs.

Site: Nearby creek or reservoir.

Procedure: Visit a creek or reservoir. Note the following points: (1) Sediment in the water. Take a sample of the water in a glass jar. What is the condition of this water? Let sample stand for three days and observe again. (2) How vegetation keeps the water from cutting the banks. (3) Evidence of the great force of flowing water. (4) Where the water comes from, how it reaches the creek, where it goes, what it is used for. (5) The presence or absence of fish. (6) Evidence of whether the creek floods. If it does, find out why. If it does not, find out why. (7) How water carries silt. What silt is; where it comes from. How to prevent loss of topsoil.

WATER FOR YOUR TOWN

Purpose: To learn about your community's water supply.

Site: Community reservoir or water-treatment plant.

Procedure: Visit the community's reservoir or water-treating plant to find out: (1) Where the water comes from. Trace it to its source. (2) What the result would be if trees and shrubs were destroyed on the headwaters. (a) Who uses the water? What would be their loss? (b) What measures are taken to protect vegetative cover on the headwaters? (3) How clear is the water before it reaches the storage point? (4) How much of a problem is silt removal, and what is its cost? How could silting be prevented? (5) Why is silt fertile? (6) Do floods cause any problems?

MORE THAN ONE USE?

Purpose: To investigate the possible benefits and problems of using reservoirs for more than one purpose.

Site: City or town reservoir.

Procedure: Visit a city or town reservoir or reservoirs. Are they used for anything except providing water? If not, why not? How much land area goes with the reservoir; who takes care of it; how much does maintenance cost; who pays for it?

QUALITY PLUS QUANTITY

Purpose: To learn the problems and cost of obtaining water fit for use.

Site: Water works, sewage disposal plant, etc.

Procedure: Visit a water works, pumping station, purifying plant, or sewage disposal plant. Find out where water comes from and the steps necessary to make it pure. Ask how water is wasted in your vicinity. Make exhibits to show wasteful practices.

INDUSTRY NEEDS WATER

Purpose: To investigate industrial demands on water supplies.

Site: Industrial plant in your area that uses water in some phase of production. (Steel mills, tanneries, food processing and bottle capping plants, paper pulp plants, etc.)

Procedure: Visit one or two industrial plants that use large quantities of water and find out how much water is used, whether water can be re-used after processing in the plant, the cost of the required water, whether they have a waste disposal problem and how they cope with the problem. Would there be more jobs for the people in your town if there were a better water supply?

WATER POLLUTION

Purpose: To investigate condition and causes of polluted water.

Site: Polluted river or stream in your community.

Procedure: Visit a heavily-polluted stream or river and write a report on its condition under the headings of: (1) color; (2) smell; (3) fish; (4) swimming. Unfortunately pollution is not difficult to find, especially near cities and towns. You should find the source of the pollution, that is whether it is a domestic sewage outlet, a tannery, a mill, a gravel operation, cheese factory, etc.

MULTIPLE USE PROBLEMS

Purpose: To learn about problems of multiple-use of the same water resource.

Site: Your community or watershed area.

Procedure: Find out whether one water supply in your area is used in great quantity for more than one purpose, for example, city water supply and waste disposal, or navigation and power. Does the use of water for one thing make it difficult for the other users? How might the difficulties be minimized?

WATERSHED PROJECT

Purpose: To see the effects of large water projects on the surrounding area.

Site: Local watershed water project.

Procedure: Visit a project built for flood control, or for increasing summer flow in a river, or for irrigation purposes, and report on conditions before and after construction. The best way to do this is to get in touch with the nearest River Valley Conservation Authority and arrange to visit one of their projects.

IRRIGATION TRIP

Purpose: To learn problems and procedures of irrigation.

Site: Local truck garden, farm, nursery, etc., using irrigation.

Procedure: Study irrigation structures, leveling of land for irrigation, when and how much to irrigate, measuring irrigation water, drainage.

WELLS

Purpose: To find the depth to the surface of the underground water supply.

Site: Water wells in your vicinity.

Procedure: Visit at least three wells in the district and, by finding the depth of their water levels, discover the water table for the area. These must be dug wells, not drilled wells. Permission must be secured from the owners and wells should be as close together as possible, certainly all within 500 acres. By measuring from the surface of the ground to the surface of the water, you can get an approximate idea of the depth of the water table for a small space.

PLANNING IS IMPORTANT

Purpose: To see the importance of planning for greater water use.

Site: A section that depends on well water.

Procedure: Find the depth of water table in wells in your area. How many other people have wells within a mile of your well? How deep is your well? How deep are other wells? Have you ever had to deepen your well? Why? Are there more people and/or new water-using industries in your area? At what time of the year is the water level in your well highest? Lowest? What makes the difference? If you are near the ocean, what happens to your well water when the water table drops below the level of the sea? In areas where everyone depends on private well water and septic tanks, ask city planners or planning commissions why it is important for people to have fairly large pieces of property. Where does the water from the septic tank go? How can septic tanks create poor quality well water?

YOUR WATER PROBLEM

Purpose: To learn about local water problems.

Site: Your home.

Procedure: Keep a newspaper scrapbook on local problems of pollution, erosion, soil conservation, forestry, wildlife, recreation or industries using raw ores. Are communities trying to solve any of these problems by legislation? Find out how the bills for these laws originate and what happens to the bills.

WATER FOR LIVESTOCK

Purpose: To learn the practices used by farmers or ranchers to provide water for stock.

Site: Stock farm.

Procedure: Visit a stock farm and learn: (1) the source of stock water; (2) how it is distributed to stock; (3) the approximate amount used daily. Examine a drainage ditch or tile drainage system. Why was drainage done? What have been the effects?

HOW FARMERS GET WATER

Purpose: To see how farmers overcome natural water shortages and the problems and benefits of farm ponds.

Site: Farm with a man-made pond.

Procedure: Visit a farm pond and write a report on the type and purpose of the pond. Know the type of pond, how it is constructed, how filled, and what provision is made to take care of excess water. Know what the owner uses it for: fire protection, fishing, part of his landscape plan, water for cattle, boating, skating or swimming.

MEASURING STREAM FLOW

Purpose: To learn to measure the volume flow of stream water.

Site: A nearby stream.

Procedure: Stream flow is measured in cubic feet of water per second passing a given point in a stream; this is often abbreviated c.f.s. (1) Select a 10-foot-long section of a stream which is as straight as possible, and of nearly uniform width and depth. (2) Measure the average width and depth of this stretch, and calculate the cross-sectional area of the water in square feet.*

**See Page 10.*

(3) Drop a cork or other light object in the current, and measure the time in seconds it takes to travel ten

feet. Do this three times and calculate the average time in seconds. (4) The cross-sectional area in square feet multiplied by 10, divided by the average number of seconds (as found by doing #3 above), equals the number of cubic feet per second flowing down the stream.

WATER CONSERVATIONIST

Purpose: To see how beaver activities can alter the water supply.

Site: A beaver pond, dam, etc.

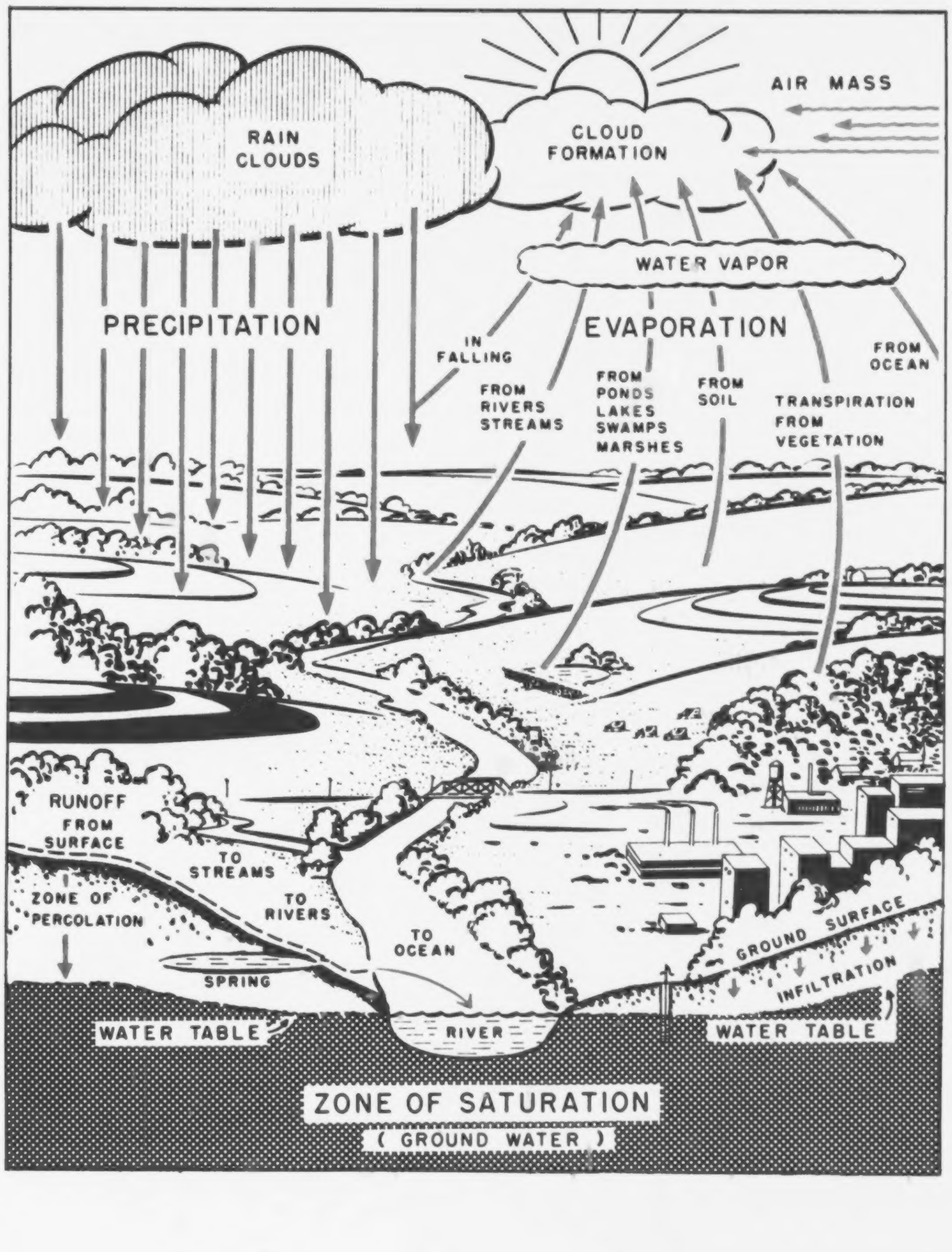
Procedure: Visit a beaver dam. Report on how the beavers work on their dams, and the effect of the dam on the surrounding area.

WORK FOR BETTER WATER

Purpose: To improve the quality of water.

Site: Stream, pond, lake, etc.

Procedure: Carry out or assist with bank erosion control or other improvement project on a stream, pond or lake. This could be on private property or camp grounds, and might (depending on conditions) consist of: (1) Grading the bank and sodding with sods pegged to the ground. (2) Rip-rapping, that is, covering the bank with large irregular stones or broken concrete. (3) Planting trees such as willow, poplar and black locust. (4) Setting willow branches and stakes in the ground so that willows will sprout and grow. (5) Stream improvement projects, such as bank plantings; construction of small dams. Be sure to get advice from local technicians. Check your work regularly to make sure it is safe from livestock damage, etc. Your biggest help may be in making regular checks on conservation devices established by local technicians and sportsmen's clubs and reporting damage or needed repairs.


AIR MASS
RAIN CLOUDS
CLOUD FORMATION
WATER VAPOR
PRECIPITATION
EVAPORATION
IN FALLING
FROM RIVERS STREAMS
FROM PONDS LAKES SWAMPS MARSHES
FROM SOIL
FROM OCEAN
TRANSPIRATION FROM VEGETATION
RUNOFF FROM SURFACE
TO STREAMS
TO RIVERS
TO OCEAN
ZONE OF PERCOLATION
SPRING
GROUND SURFACE
INFILTRATION
WATER TABLE
RIVER
WATER TABLE
ZONE OF SATURATION
(GROUND WATER)

The chart illustrates the cycle of water. Arrows show precipitation, what happens to the water when it reaches the earth, and evaporation from the earth back to the atmosphere where new clouds are formed.

"U. S. FOREST SERVICE"

35

> . . . move along these gentle shades
> In gentleness of heart; with gentle hand
> Touch — for there is a spirit in the woods.
> Wordsworth

FORESTS

Definition: Forests consist of trees and other plants; cover a large area; use soil nutrients. water and sunlight to reproduce.

Here are some things to know and remember about Forests.

Plants are the only organisms that convert the energy of the sun into food energy.

Plants and animals fertilize the soil on which they grow; they also help deplete the soil.

Every plant and animal has a function in the forest community.

Plants provide food, fuel, fiber and protection.

Insects and fungi can be beneficial or harmful to the forest.

Plants retard quick-drying of the soil by winds and rapid run-off after rainfall.

Some land produces its greatest economic and social benefits when used for forest production.

Properly managed forests can produce continuously.

Aesthetic appreciation of birds, trees, wild flowers and animal life is an important value to many people.

Ownership of forest areas, whether public or private, carries an obligation for good citizenship.

The projects that follow will help to illustrate and develop these points and give the girls a better understanding of Forests.

FORESTS

FORESTS AND PAPER

Purpose: To learn something about the cost, source and amount of paper we use daily.

Site: Any classroom.

Procedure: Girls might keep a chart for the class on the amount of paper used in classroom activities for one week. Find out where the paper comes from, the cost of its purchase and of the processing to make paper.

WHO OWNS THE FORESTS?

Purpose: To investigate the amount of forest land and the ownership pattern.

Site: Your county.

Procedure: Girls can help to encourage good forestry practices on small forests. With the help of county agent and local forester, learn how much forest land there is in the county and how much of it is in small ownerships. On a map of the county show where this forest land is located. Find out what use is made of the wood from these small woodlands and make a demonstration or exhibit showing the products and their estimated value.

OUR LUMBER

Purposes: To find out about some steps in the processing of finished lumber.

Site: Lumber yard.

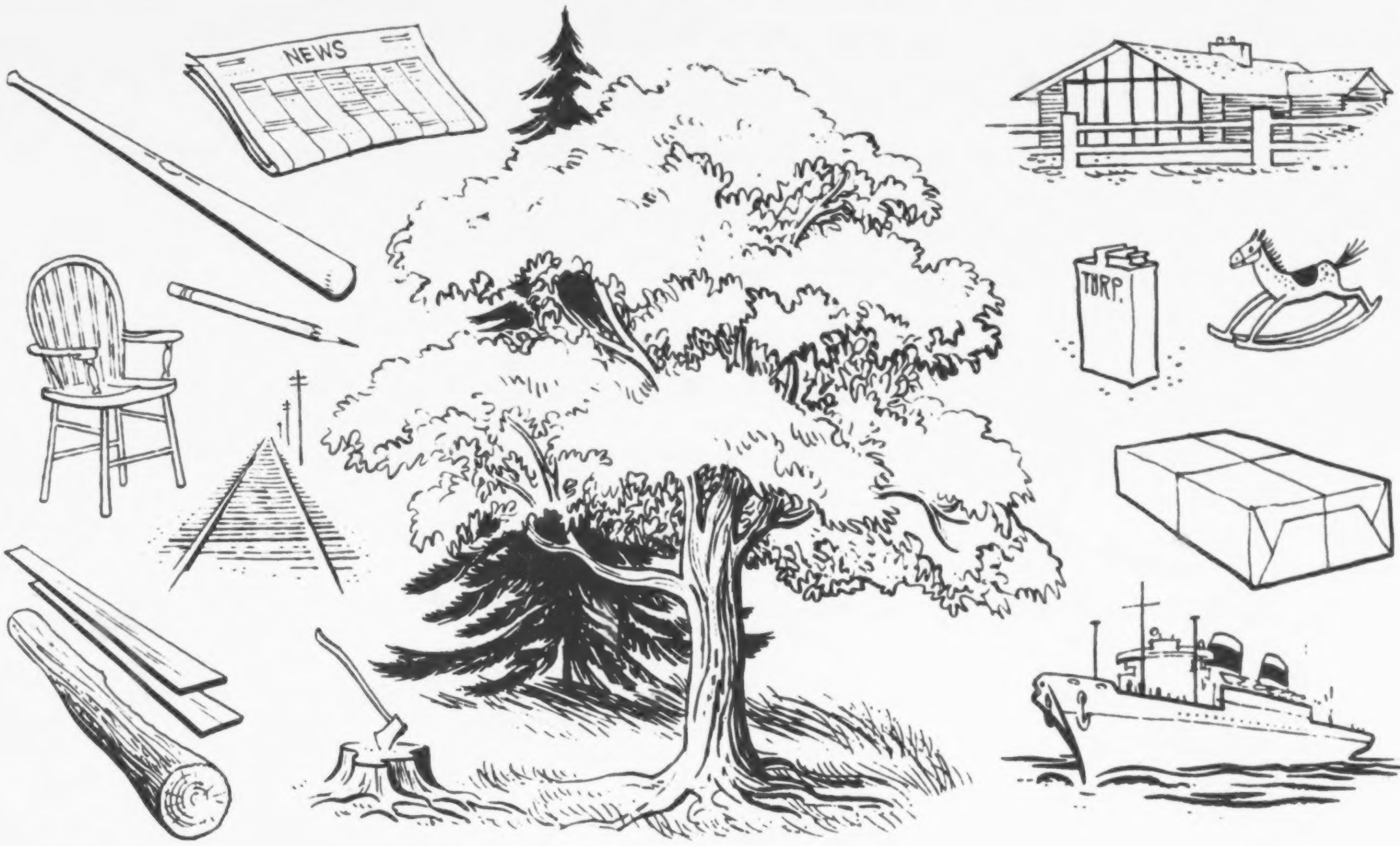
Procedure: Visit a lumber yard and find out how different kinds of wood are used and where they come from. Find out how long it takes to ready lumber for building. Learn why lumber is stacked as it is.

LUMBER AND WOOD MANUFACTURING INDUSTRIES

Purpose: To investigate some phases of the lumber and wood manufacturing industry.

Site: Any sawmill or wood products plant.

Procedure: Visit a sawmill, wood re-manufacturing plant, or lumber yard to find out: (1) Source of the raw material, (2) How the wood is sawed and processed, (3) What species are represented, (4) How sorting and grading are done, (5) How seasoning is accomplished, (6) What products are sold, (7) What conservation practices enable use of by-products or "waste," (8) Where various products are shipped, (9) Where the operator expects to obtain his future supplies.



PRODUCTS DERIVED FROM TREES—Building Materials, Paper Pulp, Household Furnishings, Etc.

FROM WOOD TO PULP

Purpose: To learn about processing of wood to pulp.
Site: Paper mill.
Procedure: Visit a paper mill. Find out: (1) What species are used and where does the raw material come from? (2) How many cords are required annually? (3) What is the manufacturing process? (4) How are waste liquors treated and disposed of? (5) Where is the final product consumed? (6) What is the source of future supplies?

DIFFERENT KINDS OF WOOD

Purpose: To identify species and uses of different kinds of wood.
Site: Anywhere.
Procedure: Obtain wood samples of different trees (from lumber yard showrooms or builders' supply house) and tell some of the uses of each kind of wood.

LEAF HUNT

Purpose: To learn to identify leaves.
Site: Out of doors.
Procedure: The group is divided into teams and each team is given a list of trees within a small radius of the playing space. At a signal from the leader, members of each team run to procure a leaf from the list. Be sure that trees and shrubs are not harmed when leaves are taken from them.

Finish: The first team with all of the leaves correctly brought in wins. If you *must* be indoors, this can be played by hiding blueprints of leaves about a room.

WHAT KIND OF LEAF?

Purpose: To learn to identify leaves.
Site: Out of doors or a large room.
Procedure: Equipment: Different kinds of leaves collected by the leader from the playing area. The number of leaves should equal the number of players comprising a team. Formation: Equal number of girls on two teams (or three if group is large); teams in files. The leader numbers the leaves and displays them so all can see them. On signal, first girl in line on each team takes a look at leaf #1 displayed by the leader and runs off to match it with one she secures. Upon her return, number two in her team looks at leaf #2 and goes to match it, and so on until all leaves are matched. The team finishing first wins the game. At the end of the game, discuss the trees from which the leaves were picked. This game may be played with any small object such as seeds, weeds, stones. Do not use specimens that should not be picked. Teach conservation.

MATCHING LEAVES

Purpose: To learn to identify leaves.
Site: Out of doors.
Procedure: The group divides into two teams and the leader carefully explains that everyone is to collect as many different kinds of leaves as she can, without taking two from the same tree or bush. At the end of three minutes, the leader signals the players to return and they sit in a circle around her. Each player lays her leaves on the ground in front of her and the leader quickly examines them to see that there are no incomplete leaves or duplicates. The team whose members have the greatest variety of leaves wins a point. The girl who had the fewest leaves then holds up one leaf so that all may see it, and names it. If she is wrong, she forfeits her leaf to the player who corrects her, and all the players with the same kind of leaf give it to the same girl.

The next player then picks up a leaf, names it, and is given all of the same kind of leaves if she names it correctly. This procedure is followed around the entire circle until every kind of leaf has been named. Finish: The team whose members have amassed the largest collection of leaves wins the game.

ALL-AROUND "WOODSMAN"

Purpose: To learn skill in outdoor living.
Site: Out of doors.
Procedure: This game is a real test of out-of-doors skill. The group is divided into groups. Tell them that this game is to see which group is best adapted to go into the woods and shift for themselves. First, if they do not have matches, they need something to make a fire. Show them a piece of flint or quartz that is in the neighborhood. When all have had a good look at it, give them one minute to get a piece. When all have gotten a piece and are back in place at the end of one minute, they are given one point. Next say that they need good tinder. If they bring back good tinder, such as gray birch bark, shreds of red cedar, nest of a mouse, give them one point. Next they must have kindling wood. It should be fine, dry, and preferably resinous. They are then sent for edible plants, such as have been found in the neighborhood. The specimens must be shown each time. Suggestions for "finds" are milkweed for greens, sumac berries for lemonade, maplesugar leaf to identify the sugar tree, pokeweed leaf for locating starch food, nuts for fat, and so on. Players are given a minute for each. The group having the best average is best suited to roughing it.

TREE IDENTIFICATION GAMES

Purpose: To learn the names and homes of trees.

Site: Wooded place.

Procedure: Equipment: Set of cards for each team with the name of a tree on each card. Cards are placed in a pile a few feet ahead of each team. The number ones each pick up a card and find the tree it names, label it, and return to their teams. Then number twos go, and so forth.

Finish: Leaders of teams check to see whether trees are correctly labeled. The team that labels the greatest number of trees correctly within the time limit wins.

Variation: Cards may be prepared for plants, ferns, mosses, and so forth, and the game may be played by having all start at one time.

WHICH TREES ARE BEST?

Purpose: To learn the trees adapted to your community.

Site: Your neighborhood.

Procedure: Take a designated tree identification hike (Set up a group tree committee and find a tree-expert advisor who will prepare a list of ten trees and addresses, trees not so well known to the girls but trees that should be planted in a community because of their adaptability). Each year a new tree list can be formed. When the groups take the hike and identify the trees, they receive a certificate of membership—something like a tree bark scroll which would list names of good identifiers.

WHAT GROWS IN THE PARK?

Purpose: To aid others in acquainting themselves with the vegetation of a park.

Site: Any park.

Procedure: Obtain correct identification, make permanent labels, and attach to trees and shrubs in a community park. Be sure to get permission from the proper authority before beginning this project.

HOW OLD IS THAT TREE?

Purpose: To determine the age and life story of a tree.

Site: Any spot with a stump.

Procedure: The rings of a tree are caused by the rapid and slow growth of the trees in the spring and summer. The rapid growth of the trees in the spring produces a wide ring, and the slow growth in the summer produces a narrow ring. By counting the number of rings in a tree, from the center to the bark, the age of the tree is determined.

Here's how: (1) With a notebook in hand, select a stump that has been cut in the woods where the rings show fairly clearly. (2) Count the lines from the center of the tree to the bark, and determine the age of the tree. (3) Starting with the center of the tree, notice a varying width to the spring rings of growth. Wherever this line is wider, good growing weather that year is indicated. Wherever the spring line is narrow, poor growing weather is designated. From the center of the tree to the bark, indicate the years in which the growth was good and the years in which the growth was poor. Pinpoint annual rings by placing pin in ring for year of an important event, your birthday, for instance.

A PROJECT IN PLANT SUCCESSION

Purpose: To examine the growth pattern of vegetation over an area.

Site: Anywhere with vegetation.

Procedure: Plants follow a very definite plan in their growth over an area. The kind of plant is greatly determined by the amount of moisture present for its growth. Thus we find in swamps and on the shores of water, near brooks, plants that grow well in abundant moisture. As the land rises from the lowlands, the water supply is lessened. Oft-times on the high elevations or where there are ledges and rocks where the water supply is meager, the type of plant is very different from the type found in the lowlands. This project is to discover this succession in plants.

Select any shore of a brook or swamp or lake in the area; mark off a strip three paces wide that will rise from the lowland to the highest point that you can find in the area. (A pace is approximately five feet. It is the distance you cover in two long steps. To find out your exact pace, mark off a length of 100 feet and walk the distance, counting the number of steps you take. Walk the distance three times; add the total number of steps; divide the total number of steps into 300. This is the distance you cover in one step. To get the number of feet you cover in two steps multiply by two. This is the length of your pace.) Identify all the plants you can find on the shore of the swamp, brook or lake. You should see water-loving plants such as rushes, pond weeds, sedges, algae and mosses. List all these, and as you go up the strip, note where these plants begin to disappear.

It will be well to start your notebook in the field, and indicate as you go up the strip not only the types of plants, but the distances and elevations at which one type disappears and another type begins. Having listed all of the types of shrubs and trees in the strip that you know, return to your meeting room in order to put the field exercises together. You should find from your

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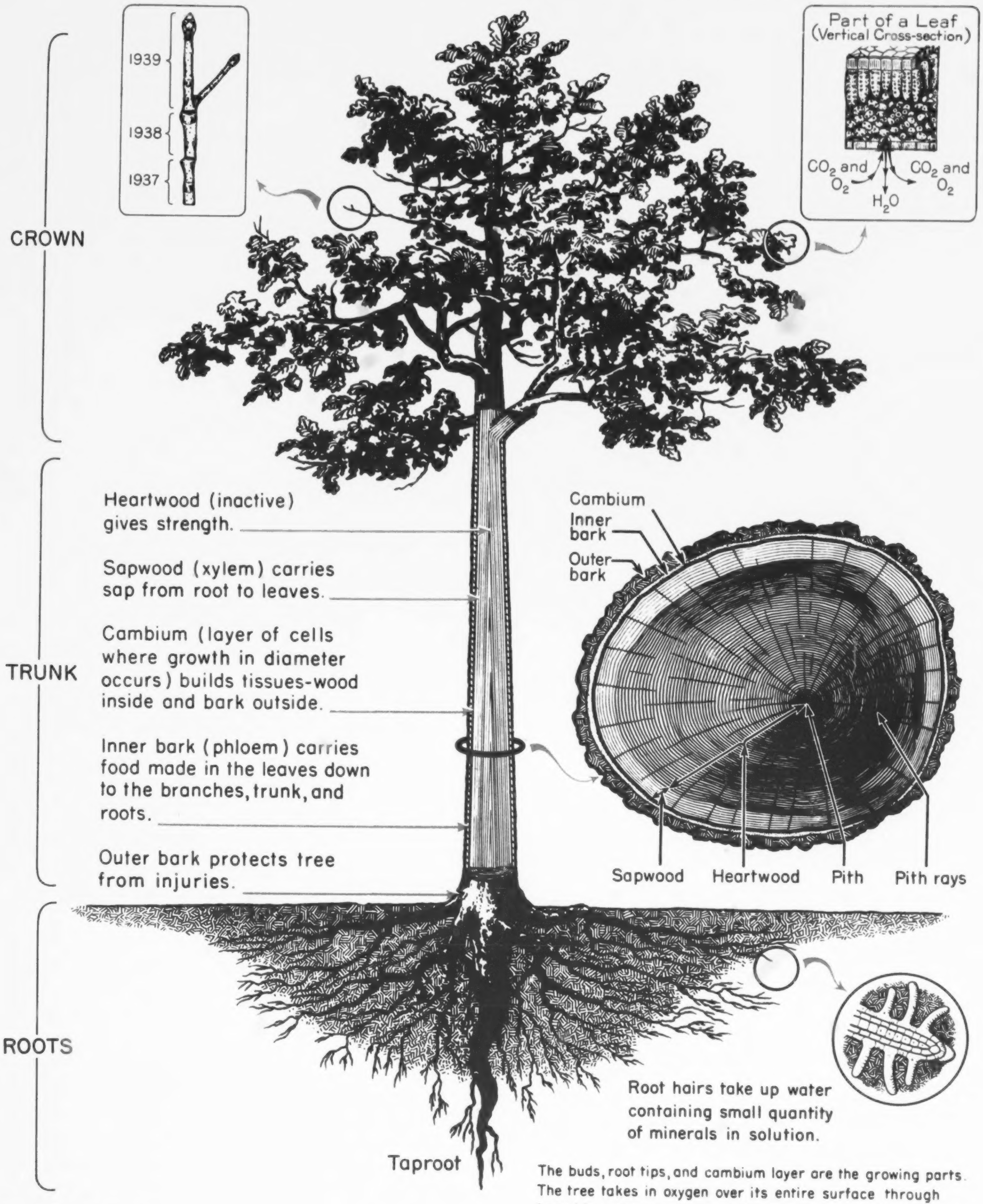


Trees increase each year in height and spread of branches by adding on a new growth of twigs.

Light and heat are required by the leaves in the preparation of food obtained from the air and soil. The leaves give off moisture by transpiration.

Heartwood (inactive) gives strength.

Sapwood (xylem) carries sap from root to leaves.

Cambium (layer of cells where growth in diameter occurs) builds tissues-wood inside and bark outside.

Inner bark (phloem) carries food made in the leaves down to the branches, trunk, and roots.

Outer bark protects tree from injuries.

Root hairs take up water containing small quantity of minerals in solution.

The buds, root tips, and cambium layer are the growing parts. The tree takes in oxygen over its entire surface through breathing pores on leaves, twigs, branches, trunk, and roots.

CROWN
TRUNK
ROOTS
1939
1938
1937
Part of a Leaf
(Vertical Cross-section)
CO_2 and O_2
H_2O
CO_2 and O_2
Cambium
Inner bark
Outer bark
Sapwood
Heartwood
Pith
Pith rays
Taproot

"U. S. FOREST SERVICE"

notes a distinct difference in vegetation as you go from the swampland to the high land.

A NEW SKIN FOR NATURE'S WOUNDS

Purpose: To find how trees can take over open land.
Site: Old field near a woods.
Procedure: Examine the field to learn whether the forest is spreading. Is it the heavy-seeded trees (hickory, beech, or other nut-bearing trees) or the light-seeded trees (aspen, ash, maple, pine, hemlock and others) that are the pioneers? In the field, where are the pioneer trees the larger—near the woods or out in the middle of the field? Why? Does the direction of the prevailing wind have anything to do with the side of the woods which will be seeded most readily? On the basis of your observations, and a study of tree seeds, what can be concluded about the rate of natural reseeding as compared with reforestation?

LIVING ENEMIES OF THE FOREST

Purpose: To show others about local forest insects and diseases and how they can be controlled.
Site: Your community.
Procedure: Girls can help protect our forests, and here's how. Work with a forester or other conservationist to make an exhibit showing damage to local forests by insects and diseases. Show how infested or diseased trees can be recognized. Demonstrate control methods.

SIDEWALK TREES

Purpose: To help sidewalk trees live a long and healthy life.
Site: Your neighborhood.
Procedure: Each girl adopts two city sidewalk trees or two trees on her property or that of a neighbor or at camp. See that they are well-watered and fertilized. In the city, try to get permission from the park department to fix a device around the square of soil in which the tree stands to keep people from walking over it and from packing the soil so tightly that water will not sink in. If you see children hanging on young trees, or damaging trees, stop them but be careful to explain why they are being destructive. In the country, make sure that the trees are not being damaged by livestock browsing or by barbed wire.

CARE OF FENCE POSTS

Purpose: To teach cause of rot and method of prevention.
Site: Your community.
Procedure: Demonstrate, with the help of a forester or county agent how to treat posts or poles to prevent rot (disease).

INSECT PESTS

Purpose: To learn about insect pests and their control.
Site: Anywhere with insect-damaged trees or shrubs.
Procedure: Locate some trees damaged by disease or insects. Ask local ranger, park supervisor, or other authority to show nature of attack, type of damage, and to explain control methods. Spray shrubs around home for control of pests.

ATTRACTIVE PARKS

Purpose: To reduce vandalism to park property.
Site: Forest picnic area.
Procedure: Obtain a damaged table, sign, hacked tree trunk, or other item from a local forest ranger. Exhibit it in your community with cards to show where it came from, what it cost, and what it will cost to replace it. Show that the item was paid for by the public—and damaged by some careless person. Point out that the damage reduces the attractiveness of the area and thereby the enjoyment of the users. In the case of the tree trunk, show how long it takes to grow a tree of equal size.

HEALTHY, HANDSOME TREES

Purpose: To reduce destruction of trees.
Site: Local recreation area.
Procedure: In cooperation with forest officials, erect a "carving" post in a local recreation area (in the group's name) for use by youthful visitors to forestall the hacking or carving of live trees. Replace with new post as required.

"KEEP AMERICA BEAUTIFUL"

Purpose: To "Keep America Beautiful."
Site: Forest recreation area.
Procedure: Make an agreement with the forest ranger in charge of a local forest recreation area to assist in clean-up campaigns during recreation season.

OUTDOOR MANNERS

Purpose: To demonstrate good outdoor manners.
Site: Your community.
Procedure: At a local forest recreation area collect tin cans, paper, bottles, and other examples of scattered trash. Display them in a local window with a card which might read, "This was scattered over the ground

at (name of recreation area) last (name day). It cost $——— to clean it up." Add other information to explain how people can help keep forest recreation areas clean and sanitary.

NEW FORESTS

Purpose: To learn about reforestation, its requirements and uses.

Site: Reforestation area.

Procedure: Visit a reforestation area in good condition, ten years old or more, and write a report on the type of soil, species of trees (evergreens and hardwoods), spacing, height, age of plantation, and why planted. Most of the answers required will necessarily be based on observations in the field. The age of pine trees (except jack pine) may be determined by counting the whorls of branches; one whorl represents one year of age. The reason for planting may be to prevent erosion, protect a spring, provide a windbreak, utilize land which cannot profitably be used in other ways, in addition to growing a crop of Christmas trees, posts, poles, pulpwood or timber.

MANAGED FORESTS

Purpose: To learn the purpose of and benefits of managed forest and watershed areas.

Site: Managed forest or watershed.

Procedure: Visit a managed public or private forest area or watershed area with its manager or supervisor. How is the forest to grow repeated crops of timber, to protect the watershed, or to provide other services and benefits?

VEGETATION AFFECTS SMALL CLIMATES

Purpose: To determine effects of vegetation on microclimates (the climates of very small areas).

Site: Natural woodland, windbreaks.

Procedure: In March, measure representative snowdepths within a large natural woodland, at distances of 10 feet and 20 feet in the open on the windward side; and at distances of 10, 20, 50 and 75 feet on the leeward side. Repeat measurements for a narrow windbreak consisting of two or three rows of planted trees not over 25 feet wide. What conclusions can be drawn? On which side of the woods or windbreak is there more snow? If you wanted less snow or wind on your crops, where would you plant? (Repeat for a shelterbelt 60 or 75 feet wide, wider than the narrow windbreak but smaller than the woodland area if purpose is to show effects of width for shelterbelt purposes.)

TOO MANY MOUTHS AND FEET

Purpose: To see the effect of too many livestock on a given area.

Site: Any poorly-managed grazing area; and any well-managed grazing area.

Procedure: Visit a woodlot which is heavily grazed by livestock and describe the condition of the undergrowth, the soil, the tree roots and the tops of trees. Contrast this with a well-managed, ungrazed woodlot.

MAPLE SUGAR

Purpose: To investigate procedure and costs of maple syrup production.

Site: Maple sugaring area.

Procedure: Learn about equipment, cost, etc., injury to trees, why tapping is done in spring, laws regulating quality and quantity of finished products.

FOREST PLANTATIONS

Purpose: To become acquainted with management practices and problems on a forest plantation.

Site: Forest plantation, tree farm.

Procedure: Visit a forest plantation. Learn: (1) Age, species, provision for protection against fire. (2) Plans for thinning. Look for "crown closing" (tops or "crowns" of trees growing very close together with intertwined branches). (3) Purpose of plantation. (4) Is management and protection adequate? (5) Possibilities for increasing area. (6) Examine ground to see whether a satisfactory forest floor (litter of decaying leaves, twigs, etc., and humus) is being developed. (7) Are full potentialities of plantation for conservation education being utilized?

TIMBER-CUTTING OPERATION

Purpose: To see first-hand the practices in a timber-cutting operation.

Site: Timber-cutting area.

Procedure: Make a trip to a timber-cutting operation. (Arrange for a conducted tour. The safety element is important.) (1) What types of trees are being cut? (Old, decadent, insect-infested, all those over a certain diameter?) Are trees selected or are they "clear cut?" Who selects the trees for cutting? How are they marked or selected for cutting? (2) What species are being cut? Which are considered the most valuable species? Are there any diseased or insect-infested trees in the uncut forest? How can you tell? (3) Are any provisions being made to see that the new stand will be composed of the more valuable species? (4) What parts of the trees are used? (5) Trace the tree from the time it is selected (marked) until it reaches the lumber yard. (Marking, felling, trimming and bucking, skidding, decking, loading, hauling, processing through the mills, sorting and grading, seasoning, shipping.) Follow the similar procedure for products if other than lumber. (6) What provisions are made for preventing fires? For controlling them after they start? (At the mill, and in the woods.) (7) What provision is made for disposing of slash resulting from logging? (8) Where is cutting expected to take place 5 years from now? 25 years? 50 years?

A PLAN FOR A WINDBREAK

Purpose: To prepare a planting plan for a windbreak to protect soil and crops from wind erosion and damage.

Site: Area requiring protection from wind.

Procedure: Visit an open tract of country chosen by the leader, and prepare a planting plan for tree windbreaks or reforestation. Windbreaks should be placed on the side of the area to be protected from which the prevailing winds blow—usually west or northwest, sometimes southwest—and will protect the ground for about ten times the height of the trees on the leeward side. That is, if the trees are 50 feet high they will protect the soil to a distance of about 500 feet. For reforestation purposes, the kind of trees to be used will depend on many factors such as soil, slope, exposure, moisture conditions and shade. The help of the Zone Forester should be sought for this.

FOREST TREE NURSERY

Purpose: To become acquainted with nursery practices.

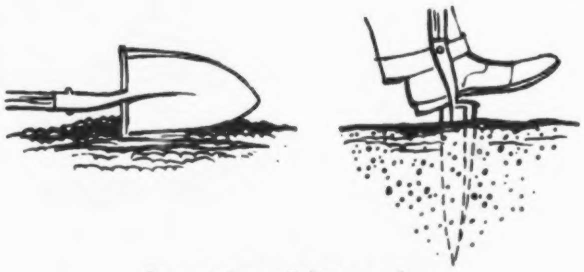
Site: A local nursery.

Procedure: Visit a forest tree nursery. (1) What species are grown? (2) How long are trees grown in seedling beds? In transplant beds? (3) How are beds prepared? How are seeding, lifting, weeding, watering and transplanting carried out? (4) Provision for protection against rodents, birds, insects, disease, freezing, fire, etc. (5) Capacity of nursery and annual production. (6) How young trees are shipped; where planted.

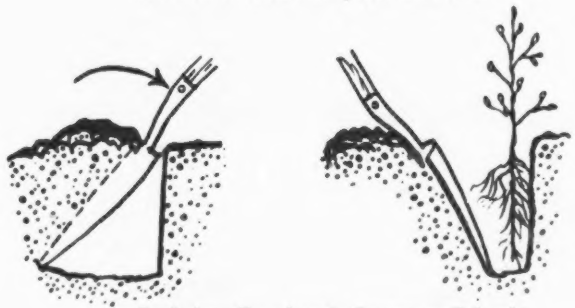
GATHERING AND TESTING SEED

Purpose: To gather and test seed for future planting.

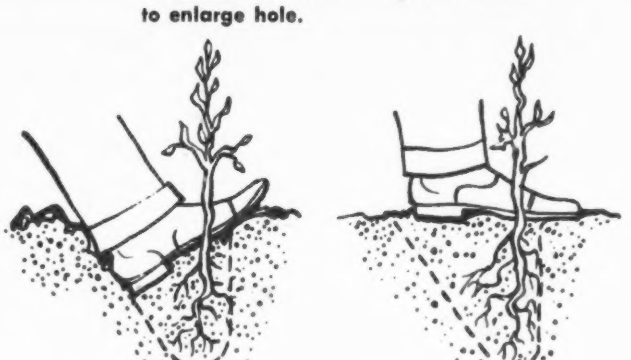
Site: Your neighborhood.



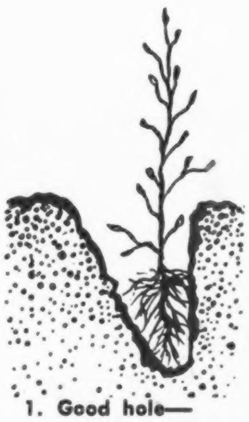
Scrape dry soil from surface. Reverse shovel and push into soil.



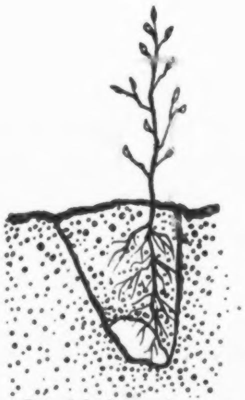
Push handle ahead. Scrape soil back to enlarge hole.



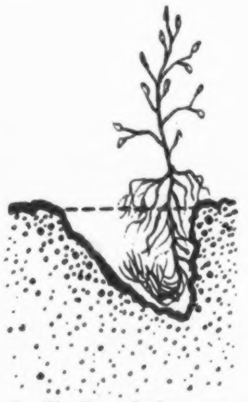
Fill in and tamp tight.



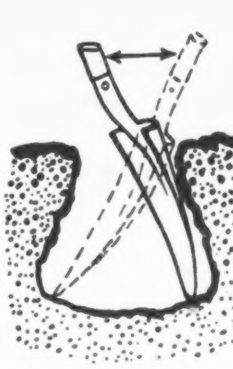
1. Good hole— tree too deep.



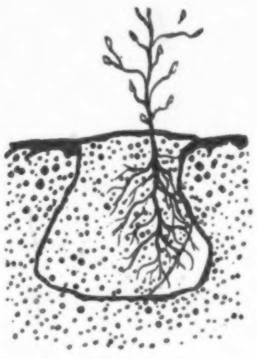
2. Good hole—air space at bottom resulting from poor packing.



3. Shallow hole, root collar above ground line, roots not in normal position.



4. "K" type hole resulting from pumping shovel handle.



5. Tree planted in "K" hole, air space in bottom of hole.

Procedure: The first step in tree planting may be to gather seed from the kind of trees to be planted. Such seed must usually be collected in the fall, six months or so before planting time, and carefully dried and stored. Refrigeration may be necessary for some seeds. Germination tests are usually made before new seeds are planted. One way you can test tree seed for germination is to fill a box (12″ x 24″ x 4″ deep) with half garden loam and half sand, well mixed together. Then plant the seeds in this soil covering with ¼″ of the same kind of soil. Make a record of the exact number of seeds planted. Place the box where temperature will vary from 45 to 55 degrees at night to 70 to 85 degrees during the day. The soil should be kept moist. As the seeds germinate, remove them from the box and keep an accurate record of how many sprout each day. After a few days, figure the germination percent by comparing the total number that sprouted to the number planted. What would cause seeds not to germinate?

WHAT TREES GROW WHERE?

Purpose: To learn about trees of other areas and the requirements for their growth.

Site: By mail to anywhere.

Procedure: Exchange seeds of trees with girls of other states. Be sure in the exchange the girls get seeds from trees that will adapt to the area in which they are to be planted. Check with your state department of agriculture to make sure it is legal to send seeds in and out of your state.

DORMANT TREE SEEDLINGS

Purpose: To provide proper conditions to acquire dormant tree seedlings.

Site: A satisfactory nearby plot of ground.

Procedure: Plant some seeds thickly in a concentrated outdoor area in order to give out dormant seedlings and perhaps hardier seedlings for planting on Arbor Day.

METHODS IN PLANTING

Purpose: To know and supply a tree's requirements for growth.

Site: Any suitable planting spot.

Procedure: After a young tree is planted, it should: (1) Be at correct depth, about ¼″ deeper (never higher) than in the nursery. It is easy to see the old ground line on the tree. (2) Have the main roots nearly straight, not doubled, or sharply bent. This is very important. (3) Have the soil firm around the roots, so that the tree cannot easily be pulled out. (4) Have an upright position and be nearly even with the general ground level, not sunk in a hole or raised on a mound.

CONTOUR PLANTING

Purpose: To see the value of running furrows across a slope.

Site: Any contour-plowed area.

Procedure: Contour planting means that the furrows for tree planting are run on the level, that is across the slope instead of up and down it. Visit an area that has been contour plowed.

PLANT A WIDE VARIETY OF TREES

Purpose: To acquire and promote biological control of tree insect and tree disease pests.

Site: Your community.

Procedure: To acquire biological control in tree planting, the girls in a community highlight one tree per year. A tree that adapts itself and will grow in the area should be chosen and introduced to the public. The girls might gather seeds, plant them at a certain location, such as a city greenhouse or aboretum, later replant in pots and give out to the public at an Arbor Day ceremony to plant. Each girl, if she has a yard, should plant one of the seedlings in her own yard in a well-chosen spot. If additional seedlings are grown, they should be given with planting instructions to neighbors or friends or to the general public. The next year another tree should be chosen as the Tree of the Year, etc., until over a period of years a wide variety of trees have been highlighted and planted. This wide distribution of species will prevent an epidemic taking all trees at once. Young girls can make posters to educate the public to plant a wide variety of species and highlight one tree each year for planting. Older girls can write essays to educate the public as to the biological control theory. Put on an Arbor Day or public ceremony highlighting the Tree of the Year. At the ceremony the posters may be exhibited and essays read. Each year in a given area, plant a few seedlings of the species of the year. After several years this area will contain some of all of the trees highlighted by the girls. It might be known as the Camp Fire Girls Grove. Keep records of the number of trees or seedlings that survived each year.

A LIVING MEMORIAL OF TREES

Purpose: To plant a tangible memorial for future enjoyment.

Site: Suitable treeless area.

Procedure: Plant small trees for a memorial, community or school forest. The area can be increased by future plantings. The usual Arbor Day planting of one tree is a fine feature, but rather as a gesture and not as a tangible memorial which will provide enjoyment for a group. Government forestry or conservation agencies, and county agents are a source of guidance. (1) Determine what species are best adapted for the particular site and for the purpose contemplated. (2) Agree upon time to plant, method to be used, spacing of trees, organization of the work, tools needed, transporting of stock, caring for it upon arrival. (3) Train the planting crew; observe a suitable division of labor. (4) Plant the trees. (Why not hold a picnic at the end of the job?) (5) Dedicate the grove. Erect an identification sign. (6) Care for the trees after planting. Consider need for protection, firebreaks, fences, cultivation, watering.

TREE WEEDING AND PRUNING

Purpose: To improve growing conditions for preferred tree types.

Site: Wooded area.

Procedure: Help thin and prune woodland on public land or private property for purpose of improving tree growth or specie composition.

In every part of nature that man uses for his own good, some plants are undesirable for his use. In a garden, we promote the growth of one group instead of several. So, in the forest, man may train certain trees to grow for his benefit, and exclude others. The trees that are excluded are called weeds. Under careful management, these trees can be taken out of the forest or yard, greatly benefiting others that are grown for man's use.

As a general rule, the trees of greatest importance are of four kinds: those that are used for lumber, those that are used for fuel, those that have aesthetic value in yards, parks or building grounds, and those that protect watershed or serve as windbreaks. Trees that are removed can be used for fuel, or the slash can be used to fill eroding gullies or in the construction of brush piles for wildlife. Trees removed from woods or property would be the ones with defects. Remember that wherever there is a clump of tree growth forming, all these should be removed except one: that one should be the best of the group, the one that already is standing straight and tall.

Use an area small enough to be workable and feasible for the girls but large enough to have long-lasting value.

Small trees you can remove yourself but be sure you are careful handling an axe and saw and that you have the property-owner's permission. Many trees can be improved by careful pruning. A general set of rules for pruning are:

a. Do not prune until tree reaches pole size (about 2″ in diameter).

b. Cut branches flush with the trunk.

c. Cover trunk scars with tar or creosote.

d. Never prune more than one-third of the crown, for the leaves must feed on a vast rooting system.

Large trees that need weeding out can be marked with chalk and you can encourage owners to remove them. Ask for help from your state forester, local park authorities or personnel of the state forestry or park department or commission. Report on conversation with owners and on efforts to get technical assistance.

What is best use of the slash from prunings and thinnings?

How many good trees are there in your area? What would be the approximate percentage of good trees?

Help thin and prune woodland on public land or private property for purpose of improving tree growth or specie composition.

CONTROL OUR FOREST FIRES

Purpose: To learn about control of forest fires so you can do your share.

Site: Lookout or fire ranger or fire warden headquarters.

Procedure: Visit a lookout, or a forest ranger's or fire warden's headquarters to find out how forest fires are prevented, detected, and controlled by determining: (1) The number and causes of fires annually in this area. (2) How fires are detected and reported. (3) How fires are controlled. (a) What equipment is used. (b) How men, tools, and supplies are obtained. (c) The steps in controlling a fire. (4) What damage forest fires can do. (5) Why burning permits are sometimes necessary. (6) What each person can do to help prevent fires.

DEFEND OUR TREES

Purpose: To eliminate destruction of trees by fire and insects.

Site: Your community or county.

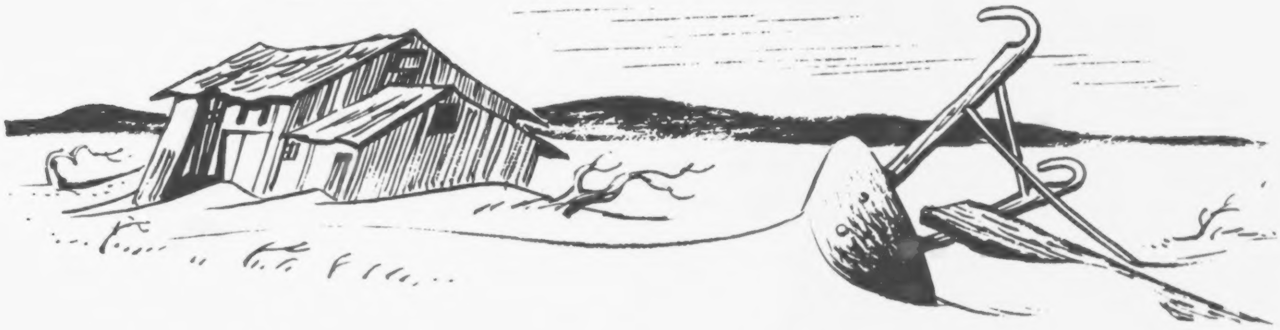
Procedure: Participate in a local fire-fighting or disease-control campaign with the help of a forester, city landscape engineer, city highway department or commercial or city nurseries and greenhouses.

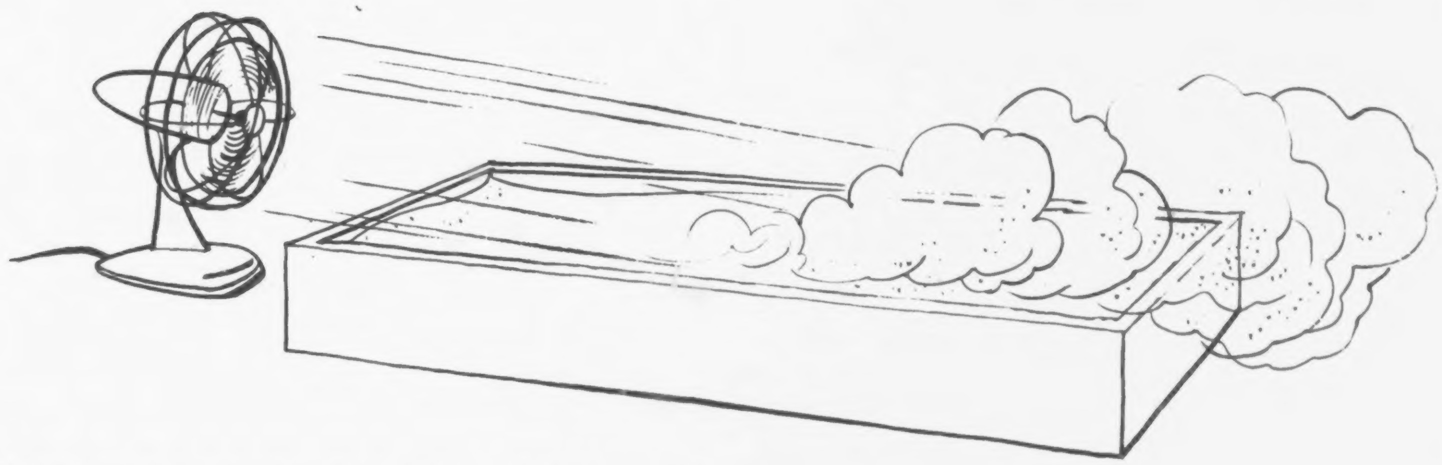
"DEAD OUT" CAMP FIRES

Purpose: To help make good campers.

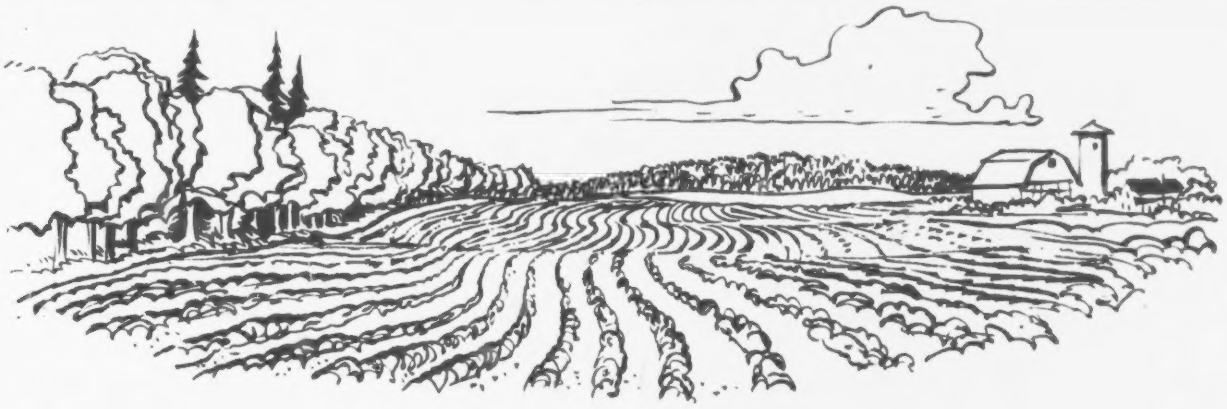
Site: Your neighborhood community.

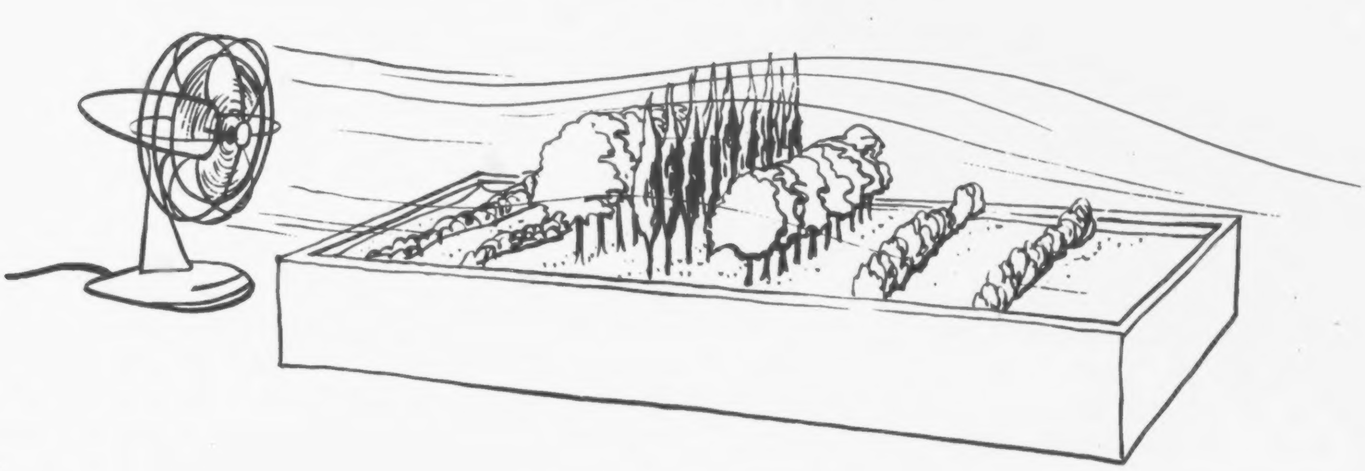
Procedure: In a open house or before a service club, demonstrate how to build a small cooking fire in an outdoor fireplace using only twigs and charcoal. Show how the same fire can be used to burn paper and garbage left over from the camping trip or picnic. Demonstrate how to make sure the same campfire is out—dead out.





shows how the unbroken force of the wind blows soil away.





illustrates how rows of trees serve as windbreaks to lessen the force of the wind on the soil surface.

FOREST FIRES ARE EVERYONE'S BUSINESS

Purpose: To learn about control of forest fires and to help educate your friends and neighbors.

Site: Your community.

Procedure: Set up a forest fire fighting instruction session with a forester and learn what to do if fire is discovered. Make posters or charts on how to prevent forest fires. Present program at PTA or church group meetings.

FIRE DANGER SEASON

Purpose: To awaken public to hazards of forest fire danger season.

Site: Your town or community.

Procedure: At the beginning of a forest fire danger season in your community, plan a special forest fire prevention exhibit for display in the windows of a local store or in your school. Learn from a local forester or forest fire warden the proper time to do this. Smokey Bear posters and other forest fire prevention material may be obtained from state forestry departments or the U. S. Forest Service. Keep-Green posters and leaflets are available through American Forest Products Industries, Inc., 1816 N. St. N.W., Washington, D. C.

"TREES FOR TOMORROW"

Purpose: To insure a continual supply of the paper and wood products you use.

Site: Any area suitable for pulp and timber species.

Procedure: Plant seedlings as part of a managed forestry plan on public lands, campsites, tree farms or small woodlots for future pulp and timber supply.

USING A DIAMETER TAPE

Purpose: To perfect a skill in measuring a tree for possible information as to its age, habits, and value.

Site: Any place with a tree.

Procedure: To measure the diameter of a tree, foresters use a special tape measure. You can make one easily. Use the back of an ordinary tape measure, or any strip of cloth about an inch wide and 5 to 6 feet long. Start at one end, measure with a ruler, 3-1/7 inches, and draw a line across the tape. Mark this line "1." From that line, measure 3-1/7 inches more, and draw a line. Mark this line "2." From the second line, measure 3-1/7 inches more. Mark this line "3," and so on to the end of the tape. Measure around the tree trunk at breast height, just as if this were a regular tape measure. You can read the diameter of the tree, in inches, directly from the numbers you marked on the tape.

HOW TO MEASURE THE HEIGHT OF A TREE

Purpose: To perfect the skill of measuring the height for possible information on the tree's age, habits, and value.

Site: Any place with a tree.

Procedure: (1) The height of any tree may be very easily found by the use of simple geometry. On a sunny day select a tree that is standing in the open and casts a shadow. With a yardstick or tape measure, measure the length of the shadow. At the end of the shadow place an observer. Have this observer face the tree and lie on her stomach on the ground. Have another observer with a long pole move along the shadow on the ground until the eye of the lying observer and the top of the pole and the top of the tree are all in a straight line. Measure the length of the pole and the distance from the foot of the pole to the observer. The distance from the eyes of the observer to the foot of the pole multiplied by the height of the tree (the unknown in this case) equals the length of the shadow multiplied by the height of the pole. The answer to this equation will give you the height of the tree. Try this on three or four trees so that you will get familiar with this particular way of measuring the height of a tree. (2) Draw a diagram in your notebook illustrating this method of tree measurement.

ESTIMATING THE VALUE OF A TREE

Purpose: To estimate the sales value of timber.

Site: Any place with a tree.

Procedure: Lumber is measured by a system called "board feet." A board foot is the amount of lumber contained in a board one inch thick, one foot long, and one foot wide. The number of board feet in a log is determined from tables which have been prepared by lumbermen. These tables show us how to determine the number of board feet in a log after you have found two measurements: first, the diameter of the small end of the log; second, the length of the log. Logs have standard lengths, starting as a general rule, with an eight-foot length, and then 10-, 12-, 14-, and 16-foot lengths. All other lengths, either shorter or longer are *specials.*

1. If possible, find a log in the forest, measure the length of the log and the diameter of the smallest end of the log. After securing these two measurements, bring them to your instructor, and your instructor will give you the number of board feet from the table which he possesses. If the tree that you are measuring is a fallen tree, measure off on the trunk of the tree as many logs as you can of these standard lengths, not going into the top of the tree where the branches are abundant. Meas-

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ure carefully the small end of each log that you have laid out. Take these measurements to your instructor and find out how many board feet in your tree. The current price for logs in the woods is about $8.00 per thousand board feet. Figure out how much your tree is worth.

2. After considerable experience estimating thus with fallen trees, you may try your skill at estimating the number of logs of standard length. Then estimate the number of board feet in the estimated logs, which when added together will give you the number of board feet in the entire tree. Submit these measurements to your instructor, and record all data in your notebook.

KNOTS IN LUMBER

Purpose: To investigate the growth habits producing clear lumber and the value of such lumber.

Procedure: Knots in lumber are caused by limbs which stay on the trees for a great many years, often until the tree is cut. Find pieces of board which contain knots and other pieces which are entirely free from knots. Exhibit them with drawings or sketches to show a tree from which the clear board came. Explain how clear lumber can be obtained.

HOW LIVESTOCK HARMS WOODLANDS

Purpose: To observe effects of livestock on forest growth and reproduction.

Site: Grazed woodland area.

Procedure: Visit woods that have been grazed. Look for absence of young seedlings, damage by browsing of leaves and twigs, injury to soil and roots by trampling, start of erosion caused by trailing of stock to salt or water, bare and hard-packed ground. Dig down and note depth of topsoil. Compare with depth in cultivated field and in ungrazed woods. (1) What is effect of grazing this woodland? (a) Now? (b) Ultimately?

BENEFITS FROM UNGRAZED WOODLAND

Purpose: To prove the benefits of keeping livestock out of woodland areas.

Site: Grazed and ungrazed woods or forest.

Procedure: With models or photos, show how a hardwood forest protected from grazing animals compares to one where animals are allowed to graze.

KEEP OUT THE LIVESTOCK

Purpose: To insure proper forest growth and reproduction.

Site: Local farm woodlot.

Procedure: Offer services to local farmers in helping them build fences to protect their woodlands from grazing animals. Teach all girls to go through gates rather than climb over farmers' fences, and always to close gates after they have gone through.

PHOTO BY LARRY J. KOPP

introduction

The wild hawk to the windswept sky
The deer to the wholesome wold. . . .
Rudyard Kipling

WILDLIFE

Definition: Wildlife consists of game and fur animals, game and song birds, fish and miscellaneous animal life.

Here are some things to know and remember about Wildlife.

Wildlife is the one natural resource that belongs to all people no matter where it is found.

Access to wildlife implies responsibility to adhere to regulations that protect wildlife and people.

Food, water and cover are necessary to wildlife every day the year through.

The carrying capacity of the land for a species is dependent on the availability and distribution of food, water, cover and space.

Some species of wildlife destroy poultry and livestock, crops, the eggs and young of game and waterfowl.

Predators perform useful services in killing diseased or crippled animals, in eating insects and rodents.

Certain species are in danger of extinction.

Wildlife is a product of the land.

Without taking any land out of profitable crops, almost every farm has acres that wildlife can utilize.

Land that is drained for agriculture, industry or residence interferes with fish and fowl populations.

Conflicts in the use of wildlife can be resolved by cooperation and mutual planning.

Management practices based on comprehensive research allow wildlife to be harvested as a crop perpetually.

The projects that follow will help to illustrate and develop these points and give the girls a better understanding of Wildlife.

WILDLIFE

WILDLIFE

Purpose: To obtain help and have more fun in the study of nature and conservation.

Site: Museums, parks, camps.

Procedure: Belong to and be active in a nature club or attend a camp where conservation and nature study form a large part of the program.

WILDLIFE NEAR YOU

Purpose: To learn about the wildlife near you.

Site: In and around town.

Procedure: Select one species of wildlife common in your neighborhood, and find out what are the best ways to protect it; find out if it is a game or fur species, or provides a useful crop every year.

A WILDLIFE COMMUNITY

Purpose: To become acquainted with members of a wildlife community.

Site: A wildlife community of your own choice.

Procedure: After personal investigation, select for study one typical wildlife community approved by your leader (forest, field, marsh, pond, desert, mountaintop, ocean shore, etc.) near your home; or take your favorite campsite. Take hikes within that area and do the following:

1. List the most commonly-found plants (trees, shrubs, flowers, grasses, etc.) and animals (mammals, birds, reptiles, amphibians, fish, insects, mollusks).
2. Report on kinds of soils and most commonly-found rocks.
3. Describe springs, streams, lakes and other waters found.

From reading or talks with your leader, tell how temperature, wind, rainfall, altitude, geology, tide, wild or domestic animals or man help make a selected area what it is.

MAN AFFECTS WILDLIFE

Purpose: To see how man's activities affect wildlife.

Site: Your community.

Procedure: Learn the relationship between wildlife and natural habitat, and how man controls the natural environment.

The essential features of a habitat for any species of wildlife are food supply for summer and winter, a home or resting place, shelter from the elements, and cover to screen it from its enemies.

Man controls or affects the natural environment by altering conditions which affect these features. This may be by cutting down the bush, draining swamps, damming streams, clearing the brush along roadsides and fences, and in many other ways.

CATTLE AFFECT WILDLIFE

Purpose: To see how the presence of cattle affects the presence of wildlife.

Site: Ungrazed woodland and long-grazed pasture.

Procedure: Make a list of the kinds of birds, mammals, insects and wildflowers on a plot of ungrazed woodland of about four acres (140 yards by 140 yards square.) Make a similar list for an area of four acres of woodland, long grazed by cattle, and state why the populations are so different.

INSECT PROJECT

Purpose: To become familiar with life and habits of insects.

Site: In homes, water, fields, woods, etc.

Procedure: Find and identify 20 insects. If possible include water insects. Make a note of where you saw the insect. For at least three of the insects find out the following:

The stages of its life history.
The food it eats.
The damages it does.
The ways we control damage.
The good it does.

Make exhibits of natural materials or photographs to show any or all of the above things.

MAMMALS

Purpose: To learn about wild animals.

Site: Fields, woods, yards, ponds, etc.

Procedure:

1. Identify in the field six species of wild mammals.
2. Recognize in the field the signs of six species of wild mammals.
3. Make plaster casts of the tracks of three wild mammals; or photograph two species of wild mammals.

HOW CAN THEY LIVE THERE?

Purpose: To see how animals are able to live where they do.

Site: A nature museum.

Procedure: Examine and compare fur of land and aquatic animals. Why are they different?

BE A DETECTIVE

Purpose: To learn something about the signs of wildlife.

Site: Any woodland or woodland border.

Procedure: See how many different signs of wildlife you can find, such as tracks, feathers, nut husks, chewed cones, and pellets, droppings, nests, bedding spots, bits of hair, bones, holes in the ground, runways, and signs of browsing. Try to piece together the interesting stories that these signs tell.

TRACK CASTING

Purpose: To learn how to cast tracks.

Site: Wet ground where animals live or visit.

Procedure: Find wet ground along stream banks, pools, marshy places, or in moist soil along trails or in open spaces, and search for animal tracks. Try to determine what animal made the tracks, whether it walked, hopped, or bounded. Try to judge whether it was moving slowly or rapidly, how recently the tracks were made, etc. (Remember, even the tracks of worms and other crawling things can make interesting patterns and tell stories of the animal habits.) Estimating the age of tracks involves consideration of the type of soil, recent rainfall, water levels of streams or ponds, and exposure to sunlight.

To cast a track, place around it a wall or collar of cardboard (such as a two-inch section from a round rolled oats box) or a sheet metal strip, joining the ends together with a paper clip. The collar may be square, round or any desired shape. In a clean tin can, using a stick for stirring, pour plaster of Paris into water and mix it to about the thickness of smooth pancake batter. Without delay, pour the liquid plaster into the track until it fills in solidly against the collar to a thickness of a quarter-inch or more. When the plaster has hardened, lift it, collar and all, carefully from the track. Remove the collar, and clean the face of the cast with water. Trim rough edges by scraping. This is the negative cast.

VISITORS TO A WATERHOLE

Purpose: To see what animals visit waterholes.

Site: A spring, stream, pond, etc.

Procedure: Make a cumulative record of animals that frequent watering places near camp by saving negative casts made each time new tracks are discovered. A fine parents' night display can be made of imprints from all these negatives, pressed into a patch of soft earth prepared for the purpose. Each track can be identified by a baggage tag label, tied onto an upright stick or stiff wire stuck into the ground beside the track.

Prepare positive plaster casts in this way. After coating with vaseline, fill the negative cast with plaster. When the plaster has hardened, trim off rough edges. Color cast to resemble the mud around the spring, and "plant" the tracks in the mud as a sort of "museum water hole" with suitable labels. Such positive plaster tracks would be durable far beyond a camping season.

Where natural tracks are scarce, children can create synthetic "tracks" in prepared earth.

HOW THE BEAVER AFFECTS WATER CONSERVATION

Purpose: To observe the help and problems that beavers present to conservation.

Site: Beaver ponds, streams and surrounding countryside.

Procedure: The beaver affects water conservation by damming small streams. Sometimes this may be beneficial; sometimes it may be a nuisance, or even damaging. The pond may kill valuable stands of trees, and the flood may cover farmlands and roads.

RAT OR PIGEON CONTROL

Purpose: To reduce hazards to health, safety and beauty.

Site: Your community or neighborhood.

Procedure: Participate in a rat or pigeon control project under guidance of local health authorities, conservation agent or other experts. (Promotion of clean-up campaigns would be a big help in rat control.) Make a survey on an extended neighborhood area and list, photograph and report bad pigeon roosts or rat-infested areas to town council, Chamber of Commerce or health and sanitation department.

BIRDS OF PREY

Purpose: To enjoy learning the calls of the birds.

Site: A large room or level ground.

Procedure: Ground marks: Two chalk lines, one near each end of the playing space. Formation: the group is divided into two teams of equal numbers which stand in two lines facing each other. Each team represents two or more different birds. A player who is a swift runner is chosen to be a bird of prey.

The leader or one of the players gives the call of one of the various birds that the teams represent. When the team members hear their call they must rush to get behind the other chalk line without being caught by the bird of prey. Birds may be caught when they are between the lines. The game continues until there is only one left. She becomes the bird of prey and the game is repeated.

NOTE: This game is more fun if there is someone in the group who can imitate bird calls well. It is a good game and bird calling is lots of fun, so get busy.

Birds easily imitated are owls, flickers, chickadees, phoebes, red-winged blackbirds, oven birds and crows.

SAFETY IS FOR THE BIRDS

Purpose: To safeguard valuable birds.

Site: Farms, woods and fields near you or in meetings of appropriate community groups.

Procedure: Prevent the shooting of crows, hawks and owls, even though some varieties are not protected by law. This will have to be done by talking with or meeting with brothers, farmers or hunters. Your best arguments will be to illustrate by exhibits what good these animals do. Be sure to include what these birds eat.

MORE BIRDS

Purpose: To see how the number of certain birds in an area can affect the number of certain insects.

Site: Your yard and community.

Procedure: Name three insect-eating birds in your area. Are any of the insects they eat harmful to crops or other things?

HAPPIER HOMES

Purpose: To provide good conditions for birds and enjoyment for shut-ins.

Site: Your neighborhood.

Procedure: Canvass neighborhood for shut-ins and erect feeders within their view.

Erect and maintain bird house and feeder for suitable species.

Erect and maintain a bird bath. This will be especially attractive to the birds if rigged with a pail or #10 tin can hung above the bath and filled with water which is allowed to drip slowly into the bath through one or two tiny holes in the bottom of the pail or can.

TOO MANY MEANS TROUBLE

Purpose: To be kind to stray domestic animals and the wildlife they endanger.

Site: Your community.

Procedure: Help to eliminate the 2,000,000 stray cats by turning those found over to the proper authorities in the community.

FEWER "PESKY" INSECTS

Purpose: To reduce the numbers of undesirable insects.

Site: Your neighborhood.

Procedure: Help control bothersome insects by canvassing the neighborhood to check on uncovered garbage and trash cans where rains can accumulate and provide insect breeding grounds.

Control grubs on one cow.

Dust poultry for lice.

Store family blankets properly to prevent clothes-moth damage.

BENEFITS FROM WILDLIFE

Purpose: To learn and teach the benefits from wildlife.

Site: Zoos, game farms, fishing industries, etc.

Procedure: Visit the institutions or industries in your area that raise or use wildlife of some kind or are concerned with educating the public to the habits and wise use of wildlife. These may be zoos, natural history museums, fish hatcheries, game rearing farms, canning industries, fishing industries, etc. Work out a project on wildlife with advice from personnel at a zoo, natural history museum, Junior Nature Museum, etc. Whether you choose to make a report or an exhibit, make it attractive so it can be used for display purposes to help inform others of what you have learned.

PROFESSIONAL WORK

Purpose: To observe the methods of professional conservationists.

Site: Fishing and hunting areas near you.

Procedure: Go out on at least two trips with a commercial fisherman, trapper, game warden, fishery officer or conservationist and report on the methods he uses.

FARM CONSERVATION BENEFITS WILDLIFE

Purpose: To learn how farm activities can help or harm wildlife.

Site: Conservation department, fish hatchery, nursery, or game refuge or sanctuary.

Procedure: Visit the state conservation department, state fish hatchery, state nursery, game refuge or game sanctuary. Learn relationship between fish and game and farm conservation.

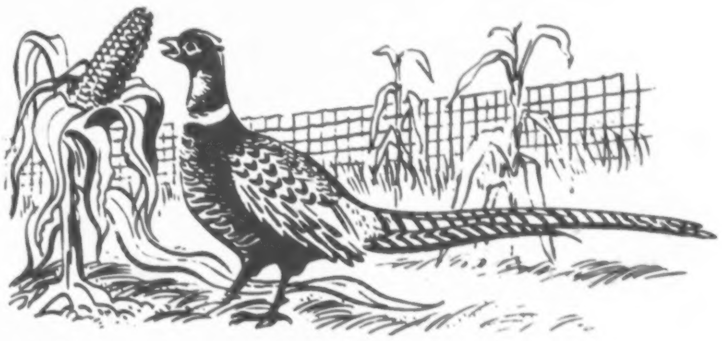
The U. S. Fish and Wildlife Service has good pamphlets to help you get the most out of these visits.

NESTING BOXES OR DEN PIPES

Purpose: To increase numbers of wildlife by providing more housing.

Site: Fields, woods, swamps, etc.

Procedure: Build and set out in suitable places nesting boxes or den pipes (hollow trees or logs). Sizes and openings can be obtained from numerous publications on the subject.



GOOD PROVISIONS

Purpose: To increase wildlife by providing food and cover.

Site: Uncultivated farm areas, along fences, by fields or highways, margin of woods and open areas.

Procedure: Help to plant a windbreak or hedge fencerow or other suitable winter cover for wildlife.

The most suitable plants for this purpose are shrubs with dense growth and fruit, which will also provide food, such as common barberry, caragana or Siberian pea and briar roses.

BRUSHPILES

Purpose: To increase wildlife by providing more cover and protection from their enemies.

Site: Clearings in woods, fields or lots adjoining woods or streams.

Procedure: Build brushpiles. A brushpile is just a pile of brush, sticks, and limbs with branches and twigs intact. Make the pile diameter 15 feet to 20 feet across and pile brush to a height of 5 to 6 feet. Locate the piles so that small game need not cross large open spaces to get to the piles. Piles do not take long to build, but their value to small game goes on for years.

OPENINGS IN THE WOODS

Purpose: To provide conditions for growth of plants that are favored by wildlife.

Site: Wooded areas.

Procedure: Make woodland openings to allow plant growth that provides food and cover for wildlife.

FISHY FORMS

Purpose: To see how the shape of a fish helps him live in the water.

Site: A pet shop, fish hatchery, museum.

Procedure: Examine shape, scales, fins, gill structure, mouth parts (one jaw longer, teeth, etc.). Why are the parts of the fish shaped as they are? How do the form of his body and appendages help him in his way of life? What are the habits and favorite food of the fish?

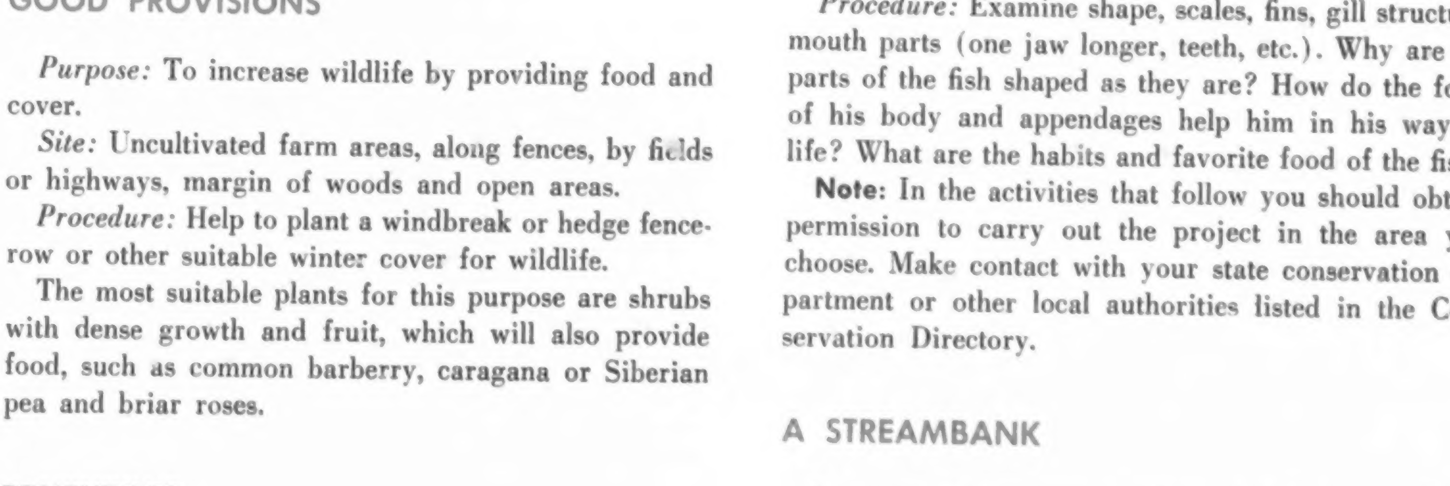
Note: In the activities that follow you should obtain permission to carry out the project in the area you choose. Make contact with your state conservation department or other local authorities listed in the Conservation Directory.

A STREAMBANK

Purpose: To increase number of fish by providing conditions they enjoy.

Site: Bare streambanks.

Procedure: Plant a streambank for erosion control. These plantings will also provide cover for some kinds of wildlife, alter the temperature of the water, and lessen the amount of harmful sediment in the water. One of the easiest things to plant is willows. Cut with a pocket knife from parent willow trees shoots of last



year's growth ½" in diameter. Pick a bare streamside spot for planting. (This will probably be easy to find.) Stick willow canes in at the water's edge about two inches apart and push the butts down to water level. Spring or fall plantings will give best results. Whenever possible, if you are planting in an area where stock graze, try to erect or have the owner of the property erect a fence to protect the willows from grazing stock.

PILE SHELTER FOR FISH

Purpose: To increase number of fish by providing more homes.

Site: Lakes, ponds, streams.

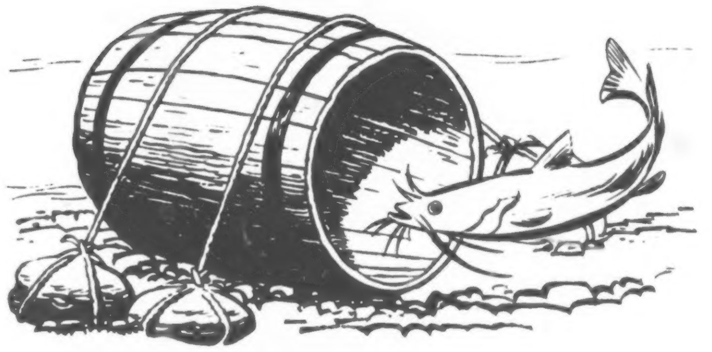
Procedure: Put in a pile shelter for fish. Tie piles of brush together with wire. Do not make them neat, but leave all branches, twigs, etc., intact. Sink the piles in the water and anchor with heavy stones or heavy scrap metal. Green sticks bent over the tops and anchored on either side will help secure piles. Small piles may be tied up on shore and sunk in the same spot to provide a sizable shelter. Bottom piles of broken cement blocks, tiles or bricks could be substituted for brush piles. Put out a simple flag float warning each swimming season if people swim in the area or would be walking in the water near the piles.

SPAWNING BOXES

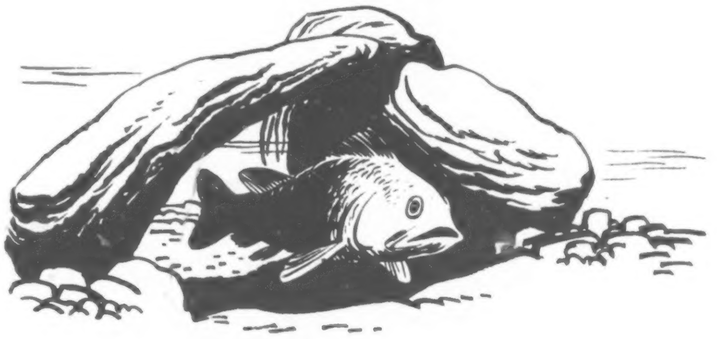
Purpose: To provide more places for fish to lay their eggs.

Site: Streams, rivers or shallow waters where there are no natural gravels.

Procedure: Build two spawning boxes for bass or trout. Make a frame of wood three feet square and about 3½" deep. Make the bottom of the box with wire screen or hardware cloth and fasten with roofing nails. Two strips of wood placed under the bottom and nailed to the side pieces will give the screen or wire mesh extra support. Reinforce corners by short diagonal strips nailed to the adjoining sides 4"-6" from the corner.



Three-quarter inch wood is a good width for this construction. Fill boxes with enough gravel (preferably golf ball size or slightly smaller) to sink the box. Lower box into water by means of ropes or uprights that can be removed, and fill to top with gravel. Sink boxes to a depth of 4 to 5 feet in areas devoid of natural bottom gravel. Space boxes 150 to 200 feet apart. Ask fathers, older brothers or sportsmen's club members to help sink the boxes. Brush piles in close proximity in water 3 to 4 feet deep will offer fingerlings protection. Your group can build boxes in the city and get help from sportsmen's clubs in placing the boxes. This project should show results very rapidly.

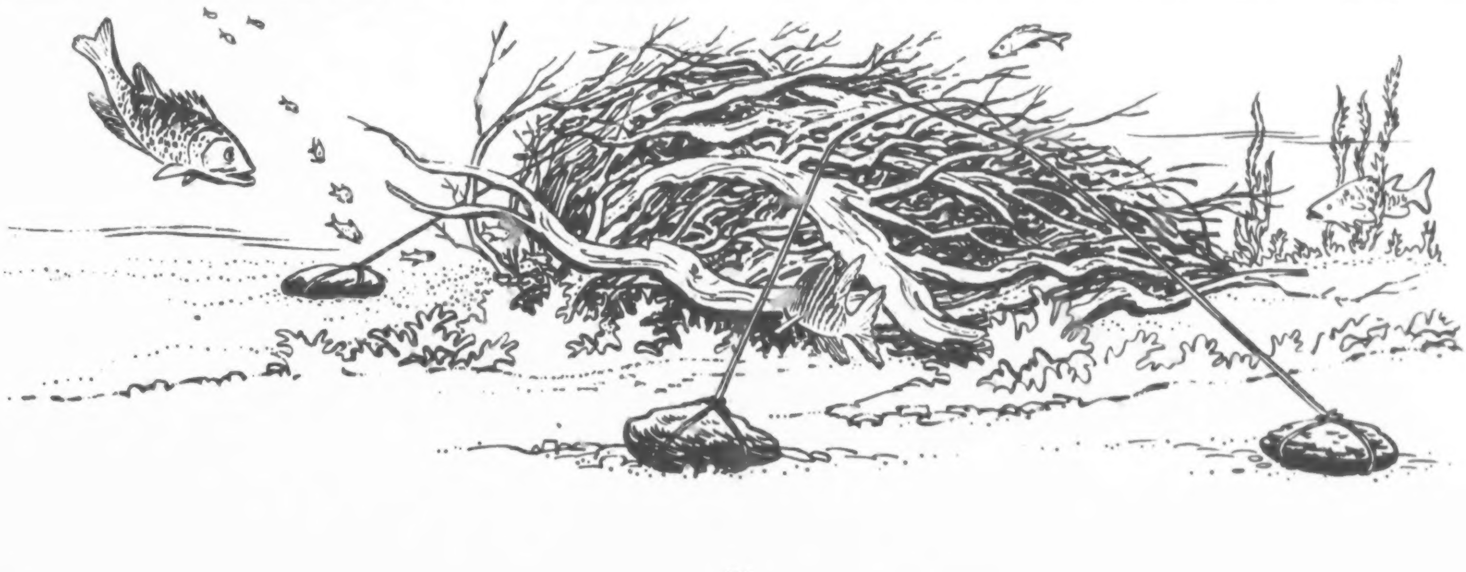


EMERGENT AQUATIC PLANTS

Purpose: To improve living conditions for fish.

Site: Lakes or ponds with very thick vegetation in the water along the shore.

Procedure: Cooperate with adults in pulling up emergent aquatic plants that are too thick for proper fish



management, along shore and in shallow areas of lakes or ponds. These may be clogging necessary pipes or other types of water inlets or outlets in addition to having an unwanted effect on the chain of life in the lake.

FARM POND

Purpose: To supply a farm pond with fish to catch and eat.

Site: Man-made pond on a farm.

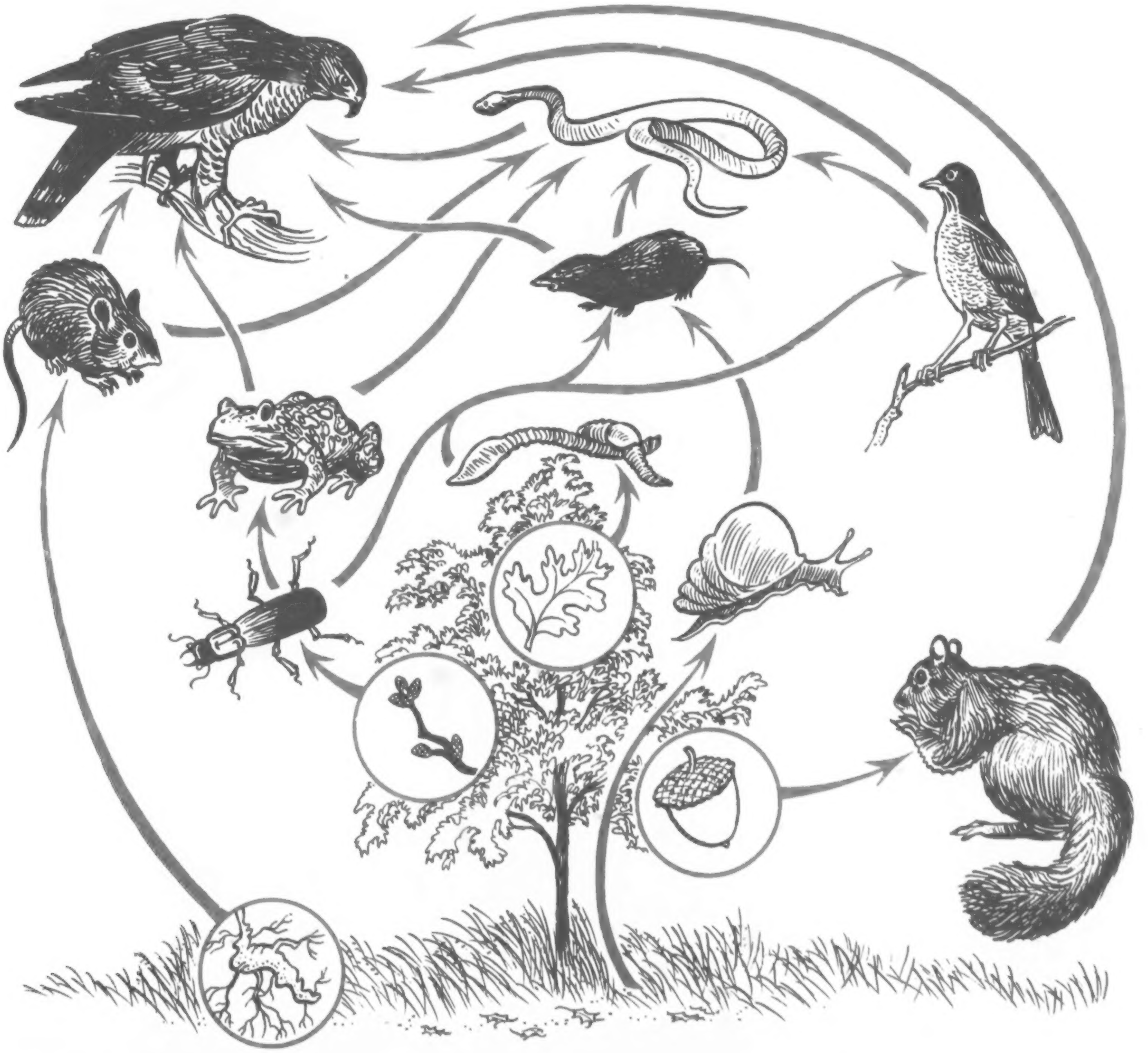
Procedure: Help to stock or fertilize a farm pond. This will require the cooperation of a pond owner.

GAME HUNTING LAWS

Purpose: To understand one way in which man protects wildlife.

Site: Your library, state game department, or local sportsmen's club.

Procedure: Know why there are laws setting definite seasons and bag limits on hunting, fishing and trapping in your area, and know the proper dates and bag limits on two species of game, two of game fish and two of fur-bearing animals.



Food Chain. Here you can trace a food chain from plant life to a red-tailed hawk, which eats only animal food. In the same way the animals that supply you with meat and clothing depend upon plant food for life.

UNDERWOOD & UNDERWOOD

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Gold is precious; iron ore is priceless.
Andrew Carnegie

MINERALS

Definition: Minerals consist of the metals, mineral fuels, lubricants, ornamental and building stones, sands and clays.

Here are some things to know and remember about Minerals.

Minerals cannot be maintained and used except in the limited sense of the use of certain long-lasting mineral products or of processing steps that require minerals and do not alter their quality or quantity.

Mineral fuels and lubricants are destroyed in use.

The other non-metal minerals are plentiful.

The parent material of the soil is mineral.

The mineral content of the soil is a factor in the growth and health of living things.

Food varies in nutrients according to the soil upon which the plants and animals were raised.

Ways of life influence demands for minerals.

No one country is sufficient to itself in mineral resources.

A nation's industrial potential is determined by its mineral resources.

Understanding of the origin of minerals is necessary if they are to be found and developed.

Available minerals should be substituted for less available minerals wherever economical.

Saving scrap metals and re-using supplies above ground will make it less imperative to mine new ores.

Good mining methods make the supply last longer.

The projects that follow will help to illustrate and develop these points and give the girls a better understanding of Minerals.

MINERALS

JEWELS, GEMS AND JEWELRY

Purpose: To find out about some kinds of minerals.

Site: Your jewelry box, mother's jewelry box, grandma's jewelry box, a jewelry store.

Procedure: Take a good look at your jewelry and take a peek at mother's or grandmother's. Find out:

1. whether they are precious or semiprecious stones;
2. what material is used in the metal that holds the stones in place;
3. where the stones and metal come from.

Are any of the things you see mineral? Visit a jewelry store and ask the salesman about the items in the showcases.

FROM ANIMAL TO MINERAL

Purpose: To see how minerals can replace animal material to form fossils.

Site: Beds of shale or other rock, especially in river bottoms; petrified forests; mud, gravel or tar pits; dry lake or creek beds.

Procedure: Hunt for the imprints of ancient tiny animals or leaves. In some places you may find petrified bones or pieces of wood. Minerals have replaced the living animal or plant material. Can you find out how?

TEASERS

Purpose: To investigate different materials to see if they are minerals.

Site: Your home, your community, the railroad tracks, ocean and lake beaches.

Procedure: Take a look at some of the things in the list below and see, from asking questions and from reading, whether these things are mineral.

1. The cement blocks and bricks in your home, school, church.
2. Sea shells or clam shells.
3. Coral reefs or bits of coral.
4. The ink in your pen and the lead in your pencil.
5. The carbon (black part) of any food you burn or marshmallow you toast.
6. The sand on the beach.
7. The soot on the windowsill.
8. The gravel between the railroad ties.
9. The fertilizers for the farm or yard.
10. The tube for your toothpaste.

All the answers aren't "yes!"

MINERALS ARE IMPORTANT

Purpose: To become aware of the use and importance of minerals.

Site: Industries (or other large mineral consumers) in your community.

Procedure: Chart: (1) Minerals in your community. (2) Source for minerals. (3) Method of transport to community. (4) Industries using these minerals. Your Chamber of Commerce can help provide information.

MINERAL PROJECT

Purpose: To become acquainted with location, nature and origin of minerals in your vicinity.

Site: Around town and in nearby countryside.

Procedure:

1. Collect specimens of four kinds of rock and mount on cardboard, showing the mineral composition.
2. Find, describe location and size of four rocks which contain these collected mineral specimens. Mount these rocks in your collection.
3. Give a short story of the general earth movements that affected the area on which your house is located.
4. Was the rock layered? Did it lie level or did it tip? If it tipped, ask a teacher of topography to go with you and measure the "dip angle." Does this dip make the area a hill? Is the soil any thinner on the highest part of the shale than at the lowest?

MINERALS IN THE SOIL

Purpose: To investigate the possible benefits and problems contributed by minerals in the soil.

Site: Your yard and community.

Procedure: Many kinds of minerals are found in the soil. The plants use these mineral nutrients to grow and maintain their health. See if you can discover:

Kinds of rocks that eroded to form the soils in your community.

Mineral content of your soil. (Many garden supply and chemical houses have simple testing kits. Agricultural experiment stations and land grant colleges often have facilities for free analysis.)

Kinds of mineral fertilizers your soil requires.

Effects that mineral deficiencies have on plant growth and appearance.

Kinds of toxic chemicals that kill plants.

Any of these that are industrial wastes and cause problems in your area? What measures are taken to curb air and water pollution?

Any of these that are used to keep undesirable plants from your lawn or are used by power companies to keep power lines clear?

The health and appearance of the land, the animals and the people where mineral nutrients in the soil are lacking. Take pictures of good and bad examples of nutrition or set up a picture display of clippings.

A GARDEN WITHOUT SOIL

Purpose: To investigate mineral requirements of plants.

Site: Your home or group meeting place.

Procedure: With the help of a botany book on plant physiology and the help of your druggist, grow a hydroponic garden. Plants are grown in chemical solutions in jars instead of in soil. Even though plants can be grown this way, what would you say about the cost of producing enough food for the county by using hydroponic gardens?

MINERALS IN WATER

Purpose: To observe the minerals contained in water.

Site: Mother's kitchen.

Procedure: Dissolve some salt, lime and soda together in a pint of water. Evaporate water and note mineral deposit that remains. Do the same with drinking water. Look inside your teakettle. What does this deposit indicate?

MINERALS IN THE HOUSE

Purpose: To become aware of the value of minerals in your life and in the lives of friends and neighbors.

Site: Your home and community.

Procedure: Name at least 20 items that you or others in your family use every day that are made, wholly or in part, of steel. Find out what care is given to the maintenance of 10 of these and take over the maintenance of 3 of them for a year. (If this involves a good bit of work, it would make a nice Mother's or Father's Day present.)

MINERALS SUPPLY INDUSTRY

The following is a list of major companies engaged in the mining and/or processing of certain minerals or metals.

Kennecott Copper Corporation
International Nickel
Alcoa
Huron Portland Cement Company
U. S. Steel
Union Carbide & Carbon Corporation
The Rubberoid Company
Diamond Crystal Salt Company
Reynolds Aluminum

Find out some of the following things about each company:

1. Where the company got its name.
2. Where the company headquarters are located.
3. Where the company gets its raw materials.
4. How many different kinds of raw materials each company mines or processes.
5. If there are any branches or subsidiaries of the companies in your community.
6. What these branches or subsidiaries produce and how they affect the people in your community.

TAKING CARE OF MINERALS—I

Purpose: To see how mineral supplies are wisely used through care of finished products.

Site: Wherever you go.

Procedure: Observe ways of protecting iron and steel. For example:

1. Lubrication of moving parts of machinery.
2. Iron painted or galvanized.
3. Farmers protect plow blades and tools with grease coating.

TAKING CARE OF MINERALS—II

Purpose: To decrease demands for raw materials by proper care of finished products.

Site: Your home.

Procedure: Ask your mother to explain how she cares for her metal furniture and kitchen equipment. Find out which waxes and cleaners she uses and why. Take over the care of some of the house furnishings that are manufactured from mineral ores.

TAKING CARE OF MINERALS—III

Purpose: To investigate raw materials in finished products.

Site: Your home, garage and library.

Procedure: Ask your father about the care of his garden and workbench tools and the car. Help in the care of these things. Where do the raw materials come from? What are the raw materials used to manufacture the equipment, oil, waxes, etc.? Use your library to help find the answers.

NEW PRODUCTS AND MINERALS

Purpose: To investigate some changing demands on kinds and amounts of minerals.

Site: Your house and grandma's house.

Procedure: Count all items in house made of aluminum. Ask grandmother what things of aluminum she had when your age. What do you think is happening to the aluminum deposits that supply industries making products that you use?

What changes in the world since your grandparents' time have demanded a greater use of minerals than before.

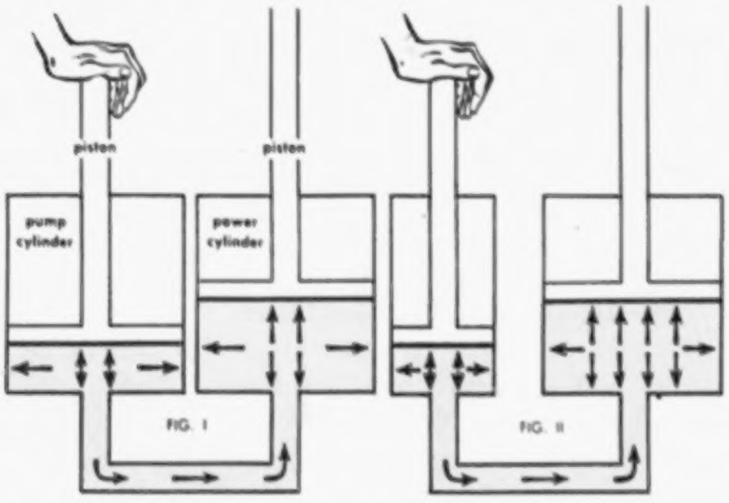
FLUID POWER

Purpose: To investigate uses and mineral demands of fluid power machines.

Site: Many places around town or mechanized farms.

Procedure: Pump or compressor delivers fluid under pressure (usually air or oil) which is transmitted through pipes or ports to a cylinder or rotor, thus driven. Cylinder or rotor does useful work. Pump or valves control fluid flow and regulate action. Whole arrangement is called a system.

Piston moving down on pump cylinder acts through the fluid to force the piston in the power cylinder to move up—with the same force and over the same distance if the two pistons are of identical area. (Fig. I) If the area of the piston of the power cylinder is greater than the area of the piston of the pump cylinder (Fig. II), the force delivered by the piston-driven cylinder will be greater than the force exerted on the pump cylinder. Make a list of at least 25 things that use fluid power. What kind of fluid do they use? Where is the fluid processed? How expensive is the fluid power part of the equipment? For how many years have the things on your list had fluid power mechanisms?



MINERALS IN MATCHES

Purpose: To investigate the minerals used in the manufacture of a match and its container.

Site: Your home.

Procedure: What's in a match? List all chemicals in a match; source for chemicals; where were matches made?

Safety match: Bulb—sulphur, rosin, fillers, oxidizing agent, binders. Paraffin dip—match splint impregnated with diammonium phosphate.

Box match: Box friction surface—amorphous (red) phosphorus, ground quartz. Safety match must be struck on box. Oxidizing agent in bulb reacts to box-surface phosphorus to create flame.

FUEL FOR POWER

Purpose: To become acquainted with the origin, travels and benefits of energy fuels.

Site: Your library.

Procedure: For the following sources of energy list origins and methods of transport around U.S. and world: (1) Coal. (2) Petroleum. (3) Natural gas. (4) Water power (including electricity and steam). (5) Wind. (6) Wood fuel. (7) Unconventional sources (atomic and solar). (8) Food—the metabolism of all living animals is dependent on food. It is estimated that about 3% of the total energy consumed is food.

ENERGY IN YOUR TOWN

Purpose: To learn about uses of energy in your community.

Site: Chart consumption of energy in community (pie wheel). (1) Space heating. (2) Electrical power. (3) Transport. (4) Iron and steel. (5) Other.

CONSERVATION BY OIL COMPANIES

Purpose: To observe conservation techniques used by oil companies and evaluate the benefits.

Site: Oil field.

Procedure: Visit an oil field. Ask about regulations on: (1) Spacing of wells and number of wells. (2) Location of wells. (3) Kinds of pipe used. (4) Production per day—past and present, estimated future. (5) Production without waste.

Ask about benefits of conservation regulation for: (1) Saving in manpower and materials. (2) Prevention of drilling unnecessary wells. (3) Improvements in technology.

Make an exhibit of petroleum products.

CONSERVATION BY NATURAL GAS INDUSTRIES

Purpose: To learn about conservation practices in and benefits of the natural gas industries.

Site: Gas wells, gas refineries.

Procedure: Visit gas wells or gas refineries. Ask about: (1) Reduction of waste from producing oil wells. (2) Increased markets for gas. (3) Pipeline construction and efficient distribution of distant markets for gas. (4) State regulations (statutes) for reducing losses to air. (5) Effects of air pollution on vegetation or city welfare.

FUEL FOR THE AIR AGE

Purpose: To investigate the demands of the air age on fuel reserves.

Site: Aviation industries, museums and libraries.

Procedure: Examine pictures or models of three kinds of airborne craft or missiles. Find out what types of fuel they use, where the fuel comes from, what problems might arise because of needs for a particular type of fuel, how much fuel is consumed for a given number of air miles, how much the fuel cost, why it is expensive or inexpensive.

CONSERVATION AND MINING

Purpose: To investigate the conservation benefits of advanced mining techniques.

Site: Coal mine area.

Procedure: Visit coal mine area—shaft or steep mine. Ask about:

1. Improvements in mechanization and mining techniques making greater amounts recoverable; making a better product and a lower cost.
2. Underground gassification of hard-to-mine coal seam.
3. Transportation from producing area.

NEW USES FOR MINERALS

Purpose: To see the effect of advanced technology on demands for a non-renewable resource.

Site: Hospital with radioisotope lab. (This project might also be done at a botanical garden, greenhouse, etc., where radioactive tracers are used in experiments.)

Procedure: Visit a hospital that has a radioisotope lab. List the minerals needed to make radioactive tests on patients. What are these tests used to detect? Are radioactive elements used as treatments for any diseases or disabilities? Where are the radioactive materials purchased? Where are they mined or processed originally? Are they expensive? What precautions must be used in handling them? Why?

SUBSTITUTES FOR MINERAL PRODUCTS

Purpose: To see how demands for certain raw materials for production may bring about the use of substitute metals or synthetic materials.

Site: Your home.

Procedure: Find two objects of the same kind that are made of different metals. Which is the better of the two? Which is newer? Are the mineral ores that went into the production of one object more abundant than those required to produce the other?

CONSERVATION AND ORE MINING

Purpose: To investigate conservation benefits of advanced ore mining techniques.

Site: Ore mining area.

Procedure: Visit an ore mine and ask about the mining methods that: (1) Make it possible to get more ore out of the ground than before. (2) Cut down on waste ores. (3) Are used to sort different grades of ore. (What are different grades used for?) (4) Increase or decrease the cost of mining operations.

FROM THE END TO THE BEGINNING

Purpose: To see how every finished product is dependent on a renewable or non-renewable natural resource. (This game is really a refinement of the game "Animal, Vegetable, or Mineral.")

Site: Group meeting room, school, playground, etc.

Procedure: Make up a game to show the chain of raw materials that go into a finished product. For example: Draw two parallel lines and mark off distance between them in feet. Line up along one line and facing the other. The first person gives the name of something as "cigarette" and moves forward one step; the second says "tobacco" and moves forward one step; the third, "leaf," and goes forward; the fourth, "plant," and goes forward; the fifth "soil," and goes forward, etc. You can take the paper or material in the filter and do the same kind of traceback. If the person fails, she remains stationary. The first to cross the opposite line is the winner.

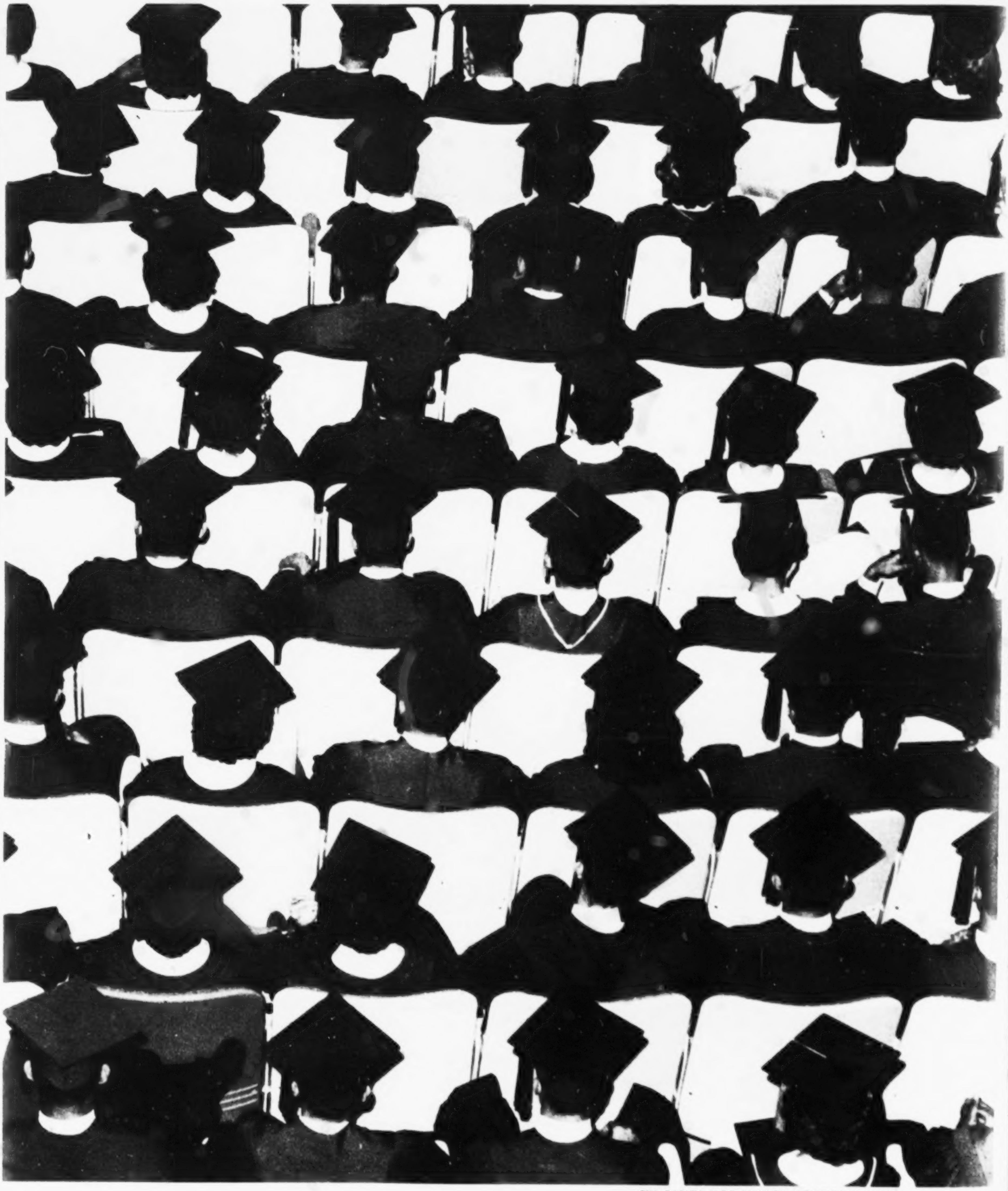
Teach your game to children at summer play school or in a church or school class to which you belong or with which you assist.

CAN THEY BE USED AGAIN?

Purpose: To help conserve non-renewable resources by re-using them.

Site: Your community.

Procedure: Collect scrap metal and sell it for funds. Stress re-use virtue. Find a buyer before you begin to collect.



BILL BARLEY, KODAK HIGH SCHOOL CONTEST

introduction

A man said to the universe
"Sir, I exist."
"However," replied the universe
"That fact has not created in me
A sense of obligation."
Stephen Crane

HUMAN RESOURCES

Definition: Human resources are those services that are possible for man to give as he develops his physical, spiritual, moral and intellectual powers.

Here are some things to know and remember about Human Resources.

Human resources are often wasted in the same sense as the other resources are wasted.

Man has used his powers in ways that did not accrue to the benefit of mankind.

Job opportunity in a community frequently depends on the intelligent use of other natural resources.

Everyone has an ability that should be developed for himself and for society.

Every individual has a place to fill in his community and an obligation to work for community improvement.

Every person has a right to an educated, healthy, wholesome community.

The projects that follow will help to illustrate and develop these points and give the girls a better understanding of Human Resources.

HUMAN RESOURCES

WHAT DO PEOPLE DO?

Purpose: To show that people are resources because they can give service; that people rely on each other for service.

Site: Your home.

Procedure: Think of one thing that you do on an ordinary day. Write it down on a piece of paper. Opposite it write down all the occupations of the people that made it possible for you to do whatever activity you choose. Even if you are just sitting in a chair reading, your list would be very long. For example: (1) Who made the house the chair is in? (2) Who got the materials the house is made of? (3) Who made the chair? (4) Who sold your family the chair? (5) How did the chair get from the factory to the store and then to your house? (6) Who built the truck or car used to transport the chair? (7) Who took care of the money that the chair cost? (8) Who printed what you are reading? (9) Who made the letters and ink that were used to print it? (10) Who wrote it? . . . and on and on and on. Everyone is important because everyone has a job to do. If even the smallest jobs weren't done, you might not have the pencil and paper to start this activity.

YOUR TOWN NEEDS NATURAL RESOURCES

Purpose: To investigate one phase of your town's dependence on natural resources.

Site: Shipping docks. (This could also be adapted for railroad yards or trucking depots.)

Procedure: Visit the loading and unloading docks on river, lake and ocean. Take pictures of the kinds of raw materials and finished products that are being imported or exported. Use photographs to illustrate exhibit on the importance of raw materials to your city or town's economy or to show how people in one area depend on the resources of another area.

OUTDOOR RECREATION AREAS

Purpose: To investigate importance and value of outdoor public recreation areas.

Site: Any outdoor recreation area.

Procedure: Visit a public recreation area such as a large city park, a beach, a national or state forest, park or historical monument, or a public campground after a weekend or holiday during late May or early September. (1) What is the condition of the area with regard to litter and rubbish? (2) What attractions are different from those offered in the vicinity of your home? (3) Why do people visit this area? (4) Where do they come from? (5) Are facilities for recreation, sanitation, information, etc., adequate to care for visitors? (6) What improvements could you suggest?

PLACES TO PLAY

Purpose: To see if the people in your community all have a chance to be healthy and happy through good outdoor recreation.

Site: Your community.

Procedure: Think of your family or the family next door. Is there a park where you can walk with your grandparents or sit in a pretty place and chat? Is there a place where Mom and Dad can play golf or tennis or whatever they like to do? Do you have a tree to climb, a place to wade or see water, a vacant lot for a game of Red Rover? Make a list of the things you and your family enjoy and opposite each thing indicate the number of blocks you must travel to do them.

Are there schools in your town that are not as pretty as yours? Do the children in any of the schools not have a place to play? They probably like to do the same things you do. Make a list and try to find out how many blocks *they* must go to do what you like to do. Do you think their parents would let them go very far? Where do the children play who live downtown in a big city? Would you like to play in these places? If not, why not? What kinds of places do children in the country have to play in? Do you think they have enough people to play with? Do you ever get to meet any of the people who live in the country?

GOOD CITIZENS MEAN BETTER PARKS

Purpose: To learn and teach some of a citizen's responsibilities for parks and picnic areas.

Site: Wherever you are.

Procedure: Write a set of rules for group or family to follow when visiting parks or picnic areas. Illustrate these rules and display in hardware and sporting goods stores or in automobile showrooms.

PARK POSTERS

Purpose: To help teach respect for preservation of outdoor parks and grounds beside roads.

Site: Any park or roadway grounds.

Procedure: Help conservation agents to put up roadside and park posters promoting public respect for outdoor areas. Check poster sites periodically to replace worn or damaged posters.

SAFETY ON THE TRAIL

Purpose: To increase the safety and value of an area for outdoor enthusiasts.

Site: Any campground, hiking or ski trail.

Procedure: Help a forester mark a hiking or ski trail, improve a campground by stacking wood, checking fireplaces, marking a good tent site, etc., or make some other improvement for recreational use.

INFORMED VISITORS

Purpose: To provide greater enjoyment of outdoor recreation areas for a greater number of people.

Site: Any outdoor recreation area.

Procedure: On weekends and holidays offer to help caretakers of recreation areas instruct visitors on how to use areas carefully. You might visit picnickers who are about to leave and discuss litter and fire precautions. If the area has special entertainment such as night campfire programs you might present a skit, original song, etc.

MUSEUMS

Purpose: To increase the value of museums.

Site: Nature or industrial museums. The latter may be separate buildings explaining the industries' use of raw materials, machinery, etc., or they may be large showrooms or displays in other municipal buildings.

Procedure: Volunteer services as nature museum aides for Junior Nature Museums, industrial museums, metropolitan park trailside museums.

A NICE APPEARANCE

Purpose: To investigate causes of and possible solutions to "littering."

Site: Your community.

Procedure: Conduct a survey of unsightly landscape features such as garish billboards; advertising displays, trash; unclean or unkempt surroundings; ugly construction; highway dumps; lack of space, grass, trees. Think over these questions: (1) How could the unsightliness have been prevented? (2) How can it be corrected? (3) What can be done to improve the appearance of your community now? In the future?

USEFUL ATTRACTIVE ROADSIDES

Purpose: To increase public awareness of a need for beauty, usefulness and safety in roadside areas.

Site: Highways and byways in and around town.

Procedure: Make a photographic exhibit of various sections of roadsides in your community that might show the following: (1) Safety provisions or lack thereof for motorists or pedestrians. (2) Aesthetic planning or lack thereof to fit highway into the landscape. (3) Evidence or lack thereof of roadside development or control. (4) Unsightly litter. (5) The number of billboards. (6) Advantages or disadvantages to owners of private property adjoining roadside. (7) The first visual impression of your community that motorists on main incoming arteries receive. (8) The facilities or lack thereof for motorists desiring roadside parks, tables, comfort stations, drinking water, etc.

Use your story as a display to accompany a report to school, church or civic groups.

VOLUNTEERS FOR RECREATION PROGRAMS

Purpose: To increase enjoyment of recreation programs.

Site: Any place with a public recreation program.

Procedure: Volunteer service to superintendent of a public recreation area to help on weekends with recreation programs offered by the administration. Choose service appropriate to the aid you can give or investigate available training.

BE AWARE OF LITTER

Purpose: To increase public awareness of the litter problem.

Site: Your neighborhood.

Procedure: Collect the trash from a given city street corner or other small area for a given length of time and use it in an exhibit in a theater lobby or other public place.

FOOD PRESERVATION

Purpose: To learn basic steps in canning or freezing food.

Site: Your home.

Procedure: Help can or freeze food grown in own or other garden. Design labels for containers with appropriate symbolism or motto relating to wise use of produce. You might use foods in a fair display before distribution. Surplus prepared foods can be stored and donated for Thanksgiving or Christmas baskets prepared by churches or welfare groups.

REMEMBER THE SHUT-INS

Purpose: To provide an enjoyable interpretation of conservation to hospitalized children.

Site: Your community.

Procedure: Have a nature or conservation film shown

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at group meeting. Arrange to have a good movie and short program and party with appropriate conservation favors in children's ward of hospital. Write to the federal and state agencies listed in the Conservation Directory to obtain loan of a good film. Design the favors to relate to something in the film.

A NEEDED GIFT

Purpose: To provide an outdoor laboratory or natural area for school body to enjoy and use.

Site: Your school.

Procedure: Offer service to school to help build a "conservation corner" on school grounds. This conservation corner may be any sized area from twenty feet square up, depending upon local conditions and area available. It is best if the area already has a few trees in it and a good sod cover on ground. If not, establishing this plant life would be a part of the project.

Locate the area and mark it or fence it off so that it is reserved as the school conservation area. Signs may be made and placed in an appropriate place, indicating the purpose of the project.

Write out long-term plans for the development of the area. The exact nature of the demonstrations will depend upon the school, whether it is an elementary school, junior high or high school. The demonstrations should be geared to fit the school conservation curriculum so that teachers may use it with the classes.

SAFE BOATING AND FISHING

Purpose: To demonstrate fishing and boat safety measures.

Site: Camps or boating and fishing areas.

Procedure: Demonstrate fishing and boat safety measures—removal of fish hooks, the space needed for safe casting, safe loads for boats and safe ways to switch positions, what to do in case of accidents. This could also be adapted to demonstrate proper precautions with firearms.

RURAL-URBAN EXCHANGE VISITS

Purpose: To acquaint yourself with the surroundings and way of life of your city and country neighbors.

Site: In and around town.

Procedure: Rural girls invite city girls, and city girls invite rural girls, to spend weekend or vacation time in one another's homes. The purpose of this exchange is to show city girls good examples of soil, water, range, wood lot, and wildlife conservation on the farm; to show rural girls such things as water treatment or pollution control in the city, as well as a visit to natural history museums or zoo.

A BETTER YARD

Purpose: To get the wisest and fullest benefits from your yard.

Site: Your yard.

Procedure: Plan your yard space for greater beauty, enjoyment and use. Draw a map of the yard and put in improvements such as new plantings, transplantings to provide a larger space for games, etc., and to insure attractive views from house windows. Choose shrubs and other plants that will beautify the yard as well as attract beneficial insects and birds by their flowers, fruits or the kind of cover they provide. Look for ways of camouflaging garbage cans and increasing privacy. You may wish to put in a screen planting and start a compost heap behind it. Look for areas of poor drainage or erosion that might be improved by simple fills or breaking up of compacted surface soil. You may wish to have a nearby agricultural experiment station or university analyze your soil and make suggestions for improving its texture and nutrient content.

CIVIL DEFENSE

Purpose: To be prepared for natural or military disasters.

Site: Your community.

Procedure: Work with a local unit in Civil Defense Ground Observer Corps, Air Force filter centers and other community programs.

THE POWER OF THE PEN

Purpose: To be aware of conservation problems and to aid legislators by sharing your opinions.

Site: Your community, state and country.

Procedure: Read the newspapers and current magazines for information on conservation problems. Think about what you read and try to visit and observe the problem area. Write your congressman, senator, and state department personnel what *you* think and have observed. Remember, this may not be what the article said or somebody else said, and you may be right.

miscellaneous

SUBJECTS TO EXPLORE FURTHER

This book is a beginning, not an end. It should encourage you to further exploration of natural resources. Here are things to think about, talk about, find out about, do something about.

What is resource management?
What are ghost towns?
Conservation news in the newspapers, on radio and television?
Our federal, state and county conservation agencies and their work?
National, state, local conservation organizations?
Conservation in school and at home? (Handle materials carefully, use supplies economically, respect the rights of others, etc.)
Let's start a conservation club.
We need a conservation bulletin.
Young people's projects.
  Boy Scouts: Conservation merit badge.
  Camp Fire Girls: Outdoors honors.
  Girl Scouts: Nature badges.
  4-H Club: Projects.
Recreation as an industry.
Good manners in the outdoors.
Poor campers I have seen.
Safety in camp.

WATER

The water cycle.
Rainfall (and snowfall records of our country).
What can be done about floods?
Control of water begins on the headwaters.
The importance of regulated water supplies to industry and navigation.
The problem of water pollution.
Water quality for recreation, fishing, swimming, boating.

FORESTS

Forest types of the United States.
Forest tree cones, seeds, important coniferous and deciduous species.
What trees take from the soil and what they put back.
Enemies of the forest (insects, disease, fire, careless cutting, grading, etc.).
Wild animals, insects and birds of the forest.
Logging in the state.
Profits from farm forest. Forestry on private lands in our state.
Shelterbelts and windbreaks.
How trees are made into lumber (or pulp, etc.).
The Christmas tree industry.
Things at home and school made of wood.
Forest recreation in our state.
Wilderness areas in national parks and national forests.
History of forest conservation movement.
Famous conservation leaders (Pinchot, Muir, Roosevelt, etc.).
Great forest fires of history.
What we lose when the forest burns.
Fighting forest fire and how you can help.
Work of (state, federal) forest experiment stations.
Industrial forestry.
What forest products research has accomplished.

WILDLIFE

Why we have fish and game laws.
Game laws we should know about.
What it means to be a good sportsman.
Fur trapping in the early days.
Income from sales of hunting and fishing licenses and equipment.
Helpful snakes, birds, insects, mammals.
How birds and wild animals protect themselves.
Practices that injure wildlife.
How farmers can help wildlife.
The value of "edge." (This is the bushy zone between an open field and the trees of a wood and is important to wildlife.)
How streams can be improved for fish life.

POSTERS TO MAKE

County (State) Maps of Resources.
Wise Use or Waste?
Let's Manage Our Resources.
Conservation Week.
Outdoor Good Manners.
Resources Give America Strength.
Only YOU Can Prevent Forest Fires.
Wildlife Restoration Week.
Keep Water Clean.
Be A Good Camper.
Conservation Begins At Home.
Grass and Brush Fires — Poor Business.
Forest Enemies.
Safety "Don'ts" For the Outdoors.
For A Better Landscape.
Guard Water Supplies.
Conservation Pledge.
Clean Highways.
This? — Or This?
Cows Make Poor Foresters.
We Need a School Forest.

THEMES FOR SLOGAN CONTESTS

Prevent forest fires.
Stop erosion.
America depends upon natural resources.
Improve wildlife habitat.
Better fishing and hunting.
Stop wasting resources.
Conservation Week.
Clean waters.
Proper use of pastures.
Every acre to its best use.

PICTURE COLLECTIONS

Unusual products made from wood.
The part forests played in the development of our country.
Wood-using industries.
Forests of the future (plantations).
Uses of water.
Waterpower development.
Local water supply.
Floods.
Wildlife of our forests (or birds, or wild animals, or fish, or waterfowl).
Hunting and fishing in the forest.
Our vacationlands.
Conservation in the news (clippings).
Waste — or conservation — in using resources.

NATURE TRAILS

Definition: A nature trail is a trail laid out with items of natural history marked with labels, signs or tags.

Suitable Sites: Abandoned roads, railroad right-of-ways, etc., old paths, established trails through varied habitats.

Uses: Basis for directed study; invite many people on nature walks without need for a guide; create interest in casual observers; correlate nature with literature, science, crafts; permit work with hands and numerous small projects.

Method of Marking: (1) Choose site with many things of interest. (2) Make attractive, effective labels and signs. (3) Give suitable descriptions, quotations and pictures for text and illustrations. (4) Stress trailside independence by balancing botany, entomology, geology, ornithology. mammalogy, forestry and conservation.

Nature Trail Signs

Construction: (A) Wood
Requires weatherproofing with varnish, etc.
Needs care each year.
Is practical—reasonable cost.
(B) Metal
Should be rustless. Zinc or copper.
Is easy to attach.
(C) Plastic
Has many forms and colors.
Is durable and weatherproof.
(D) Linen
Is not recommended.
Is used for testing or original setup of trail.

General Design: Plain plaques and uniform size and lettering; hidden information signs and multisided signs or signs with movable parts to add interest.

Information on Tags: Common and Latin names plus item of interest (good illustration). Some permanent signs, some signs changed at certain seasons.

Placement: General information and trail outline (quiz board) is a good idea at start. Use posts and tripods instead of attaching signs to plants.

Have climax of trail at lake, good view spot, etc.
Keep trail narrow, with occasional wide spot for walkers to gather.

CONSERVATION DIRECTORY

Write to the Regional Director at the nearest address and ask for the name of a local staff man in your area. It is courteous to enclose a self-addressed postal card or stamped envelope.

REGIONAL OFFICES OF FEDERAL AGENCIES

U. S. FOREST SERVICE

Regional Forester at:
Federal Bldg., Missoula, Montana. (For Montana, Idaho north of Salmon River.)
Federal Center—Bldg. 85, Denver 7, Colorado. (For Colorado, Kansas, Nebraska, South Dakota, Wyoming.)
510 Second St., N.W., Albuquerque, New Mexico. (For Arizona and New Mexico.)
Forest Service Bldg., Ogden, Utah. (For Utah, Nevada, Idaho south of Salmon River.)
630 Sansome St., San Francisco 11, California. (For California.)
729 N.E. Oregon St., Portland 8, Oregon. (For Oregon and Washington.)
Center Bldg., 6816 Market St., Upper Darby, Pennsylvania. (For Connecticut, Delaware, Kentucky, Maine, Maryland, Massachusetts, New Jersey, New York, New Hampshire, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia.)
50 Seventh St., N.E., Atlanta 23, Georgia. (For Georgia, Alabama, Arkansas, Florida, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas.)
623 N. Second St., Milwaukee 3, Wisc. (For Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, North Dakota, Ohio and Wisconsin.)

NATIONAL PARK SERVICE

Region I Hdqtrs.: 900 N. Lombardy St., Richmond 20, Va.
Region II Hdqtrs.: 307 Federal Office Bldg., Omaha 2, Nebraska.
Region III Hdqtrs.: Box 1728, Santa Fe, New Mexico.
Region IV Hdqtrs.: 180 New Montgomery St., San Francisco 5, California.

FISH AND WILDLIFE SERVICE

Region I Hdqtrs.: Swan Island, Portland 18, Oregon.
Region II Hdqtrs.: 220 W. Copper Ave., Albuquerque, New Mexico.
Region III Hdqtrs.: 1006 W. Lake St., Minneapolis, Minnesota.
Region IV Hdqtrs.: Glenn Bldg., Atlanta 3, Georgia.
Region V Hdqtrs.: 1105 Blake Bldg., Boston 11, Mass.
Region VI Hdqtrs.: 420 Federal Bldg., Juneau, Alaska.

BUREAU OF LAND MANAGEMENT

Region I Hdqtrs.: Bldg. 6, Swan Island Station, Portland 18, Oregon.
Region II Hdqtrs.: 630 Sansome St., San Francisco, California.
Region III Hdqtrs.: 1245 North 29th St., Billings, Montana.
Region IV Hdqtrs.: 238 Federal Bldg., Salt Lake City 10, Utah.
Region V Hdqtrs.: 1015 W. Tijeras Ave., Albuquerque, New Mexico.
Region VI Hdqtrs.: 224 12th St. S.W., Washington 25, D.C.
Region VII Hdqtrs.: Federal Bldg., Anchorage, Alaska.

STATE AND LOCAL OFFICES OF FEDERAL AGENCIES

DEPARTMENT OF HEALTH EDUCATION AND WELFARE

Contact local personnel of the Public Health Service.

BUREAU OF INDIAN AFFAIRS

Contact local personnel through state capital or state university.

BUREAU OF MINES

Contact local personnel through state capitol or state university.

SOIL CONSERVATION SERVICE

Clearance has been obtained in Washington from the U. S. Department of Agriculture, Soil Conservation Service, to contact the local personnel of this agency. The following is a list of addresses of state offices. Write the nearest office for the address of a staff man in your area or make direct contact with the State Extension Soil Conservationist or State Soil Conservationist if you know their location. Extension service personnel are usually located at the State College of Agriculture. In many cases technical assistance and advice can be obtained. In all cases excellent program helps are available, such as publications, filmstrips, films, etc.

ALABAMA. Soil Conservation Bldg., Alabama Polytechnic Institute Campus, P. O. Box 311, Auburn, Alabama.
ARIZONA. 223 Main Post Office Bldg., P. O. Box 929, Phoenix, Arizona.
ARKANSAS. 323 Federal Bldg., Little Rock, Arkansas.
CALIFORNIA. Tioga Bldg.—2nd Floor, 2020 Milvia St., Berkeley 4, California.
COLORADO. New Custom House—Room 321, Denver 2, Colo.
CONNECTICUT. College of Agriculture Bldg., University of Connecticut, Box U-105, Storrs, Connecticut.
DELAWARE. 503 Academy St., P. O. Box 418, Newark, Delaware.
FLORIDA. 35 No. Main St., P. O. Box 162, Gainesville, Florida.
GEORGIA. Old P. O. Bldg., P. O. Box 832, Athens, Ga.
IDAHO. Bldg. 50, 320 Fort St., P. O. Box 2709, Boise, Idaho.
ILLINOIS. Nogle Bldg., 605 S. Neil St., Champaign, Ill.
INDIANA. 611 N. Park Ave.—Room 506, Indianapolis 4, Indiana.
IOWA. Iowa Bldg.—4th Floor, 505 Sixth Ave., Des Moines, Iowa.
KANSAS. 760 S. Broadway, P. O. Box 600, Salina, Kansas.
KENTUCKY. Production and Marketing Bldg., 321 Maxwell St., Lexington, Kentucky.
LOUISIANA. Svebeck Bldg., 1517 Sixth St., Alexandria, La.
MAINE. 10 Mill St., Orono, Maine.
MARYLAND. 228 Agriculture Bldg., University of Maryland, College Park, Maryland.
MASSACHUSETTS. Cook's Block, 6 Main Street, Amherst. Massachusetts.
MICHIGAN. Michigan State University, Wells Hall, Unit E, East Lansing, Michigan.

MINNESOTA. 517 Federal Courts Building, St. Paul, Minnesota.
MISSISSIPPI. Room 400—Milner Building, Lamar & Pearl Streets, P. O. Box 610, Jackson 105, Mississippi.
MISSOURI. Highway 40 & Illinois Avenue, P. O. Box 180, Columbia, Missouri.
MONTANA. 26 East Mendenhall, P. O. Box 855, Bozeman, Montana.
NEBRASKA. Room 604, 134 South Twelfth Street, Lincoln, Nebraska.
NEVADA. Room 19—1485 Wells Avenue, Reno, Nevada.
NEW HAMPSHIRE. 29 Main Street, Durham, New Hampshire.
NEW JERSEY. Feher Building, 103 Bayard Street, P. O. Box 670, New Brunswick, New Jersey.
NEW MEXICO. Katson Building, 1015 Tijeras Avenue, N.W., P. O. Box 1348, Albuquerque, New Mexico.
NEW YORK. Byrns Building, 238 West Genesee Street, Syracuse, New York.
NORTH CAROLINA. 213 PMA Building, State College Station, P. O. Box 5126, Raleigh, North Carolina.
NORTH DAKOTA. Professional Building, Fifth and Rosser, P. O. Box 270, Bismarck, North Dakota.
OHIO. 222 Old Federal Building, 3rd & State Streets, Columbus 15, Ohio.
OKLAHOMA. State Office, Soil Conservation Service, Stillwater, Oklahoma.
OREGON. Ross Building, 209 Southwest 5th Avenue, Portland 4, Oregon.
PENNSYLVANIA. 100 North Cameron Street, Harrisburg, Pennsylvania.
(RHODE ISLAND combined with CONNECTICUT)
SOUTH CAROLINA. 6th Floor—Associates Building, 901 Sumter Street, Columbia, South Carolina.
SOUTH DAKOTA. Knights of Columbus Building, 56—Third Street, S.E., P. O. Box 1357, Huron, South Dakota.
TENNESSEE. 561 U.S. Court House, Nashville 3, Tennessee.
TEXAS. First National Bank Bldg., 16-20 S. Maine St., P. O. Box 417, Temple, Texas.
UTAH. 222 S.W. Temple St.—Room 220, Salt Lake City 1, Utah.
VERMONT. 481 Main St., P. O. Box 736, Burlington, Vermont.
VIRGINIA. 900 N. Lombardy St., P. O. Box 5367, Richmond 20, Virginia.
WEST VIRGINIA. Lazzelle Bldg., 178 Forest Ave., Morgantown, West Virginia.
WISCONSIN. 3010 E. Washington Ave., Madison 4, Wis.
WYOMING. Tip Top Bldg., 345 E. Second St., P. O. Box 699, Casper, Wyoming.
WASHINGTON. 301 Hutton Bldg., S. 9 Washington St., Spokane 4, Washington.

4-H AND YMW PROGRAM

To contact 4-H Club Agents, etc., write to County Extension Service in your county seat.

UNITED STATES FOREST SERVICE

Clearance has been obtained in Washington from the U. S. Department of Agriculture, U. S. Forest Service, to contact the local personnel of this agency. The following is a list of the addresses of state offices. Write the nearest office for the address of a staff man in your area or make direct contact with the State Forester, Chief Forester, Forest Director, Extension Forester, Forest Ranger, etc., if you know their location.

ALABAMA. State Forester, 5 N. Bainbridge St., Montgomery 4, Alabama.
ARIZONA. None.
ARKANSAS. Forest Director, P. O. Box 1940, Little Rock, Arkansas.
CALIFORNIA. State Forester, State Office Bldg. #1, Sacramento 14, California.
COLORADO. Extension Forester, Colo. A & M College, Fort Collins, Colo.
CONNECTICUT. State Forester, 165 Capitol Ave., Hartford 15, Connecticut.
DELAWARE. State Forester, State House, Dover, Delaware.
FLORIDA. State Forester, P. O. Box 1200, Tallahassee, Fla.
GEORGIA. Forest Director, State Capitol, Atlanta 3, Ga.
IDAHO. Dean of Forestry, University of Idaho, Moscow, Idaho.
ILLINOIS. State Forester, 301½ E. Monroe St., Springfield, Ill.
INDIANA. State Forester, 311 W. Washington St., Indianpolis 9, Indiana.
IOWA. Supt. of Forests, 7th and Court Sts., Des Moines 9, Iowa.
KANSAS. Extension Forester, State College, Manhattan, Kansas.
KENTUCKY. Forester Director, Division of Forestry, Frankfort, Kentucky.
LOUISIANA. State Forester, P. O. Box 1269, Baton Rouge 1, Louisiana.
MAINE. State Forester, Main and Forest Service, Augusta, Maine.
MARYLAND. Forest Director, State Office Bldg., Annapolis, Maryland.
MASSACHUSETTS. Forest Director, 12 Ashburton Place, Boston 8, Mass.
MICHIGAN. Director Division of Conservation, Michigan State College, East Lansing, Michigan.
MINNESOTA. Forest Director, State Office Bldg., St. Paul 1, Minnesota.
MISSISSIPPI. State Forester, P. O. Box 649, Jackson 5, Miss.
MISSOURI. State Forester, Jefferson City, Mo.
MONTANA. Dean of Forestry, Montana State University, Missoula, Montana.
NEBRASKA. Extension Forester, University of Nebraska, Lincoln 1, Nebraska.
NEVADA. Extension Forester, State Capitol, Carson City, Nevada.
NEW HAMPSHIRE. State Forester, State Office Bldg., Concord, New Hampshire.
NEW JERSEY. State Forester, State House Annex, Trenton 7, New Jersey.
NEW MEXICO. None.
NEW YORK. Forest Director, Lands and Forests Div., Albany 7, New York.
NORTH CAROLINA. State Forester, P. O. Box 2719, Raleigh, No. Caro.
NORTH DAKOTA. State Forester, Botineau, No. Dak.
OHIO. Chief of Forestry, 1500 Dublin Rd., Columbus, O.
OKLAHOMA. Forest Director, 536 State Capitol, Oklahoma City 5, Okla.
OREGON. State Forester, Salem, Oregon.
PENNSYLVANIA. Chief of Forests, Bureau of Forests, Harrisburg, Penn.
RHODE ISLAND. Chief Forester, 18 State House, Providence 2, Rh. Island.
SOUTH CAROLINA. State Forester, 506 Calhoun Office Bldg., Columbia 1, So. Caro.
SOUTH DAKOTA. State Forester, Pierre, So. Dak.
TENNESSEE. State Forester, 309 N. State Office Bldg., Nashville 3, Tenn.
TEXAS. Forest Director, A & M College, College Station 5, Texas.

UTAH. Forestry Professor, Utah State Agricultural College, Logan, Utah.
VERMONT. State Forester, Montpelier, Vermont.
VIRGINIA. State Forester, University Station, Charlottesville, Virginia.
WASHINGTON. Forestry Head, State College of Washington, Pullman, Wash.
WEST VIRGINIA. State Forester, Charleston 5, W. Va.
WISCONSIN. Conservation Director, Madison 2, Wisc.
WYOMING. Assistant Director, Experiment Station, Laramie, Wyo.

STATE GOVERNMENT AGENCIES

In some states the various branches of the government concerned with natural resources are unified in a Department of Natural Resources. In other states the various branches are separate government divisions. Your public library will have information on the organization of these government agencies in your state. Many states can provide technical assistance. All states can supply valuable program materials in the form of publications and/or films and filmstrips.

NATIONAL ASSOCIATION OF SOIL CONSERVATION DISTRICTS

A district is a subdivision of the state government. Your county newspaper or Junior Chamber of Commerce will have information on contacts.

PRIVATE CONSERVATION INTERESTS AND ORGANIZATIONS

AMERICAN FOREST PRODUCTS INDUSTRIES, INC.

Write for free materials and information on their conservation program to: Education Division, 1816 "N" Street, N.W., Washington 6, D.C.

BOY SCOUTS OF AMERICA

Contact local Boy Scout office for name and address of leader working on conservation activities.

AUDUBON

Call local office of National Audubon Society; Audubon Junior Clubs.

LEAGUE OF WOMEN VOTERS

Contact local member or write League of Women Voters of the U.S., 1026 17th St., N.W., Wash. 6, D.C.

THE MEN'S GARDEN CLUB OF AMERICA

Contact local member.

THE GARDEN CLUB OF AMERICA

Contact local member or office.

FEDERATED GARDEN CLUBS OF AMERICA

Contact local member.

JUNIOR GARDEN CLUBS

Contact local group through adults in The Garden Club of America.

NATIONAL WILDLIFE FEDERATION

Contact local representative or write: National Wildlife Federation, 232 Carroll St., N.W., Wash. 12, D.C.

AMERICAN CAMPING ASSOCIATION

Contact local member or write: American Camping Association, Inc., Bradford Woods, Martinsville, Ind. This organization put out an excellent publication on *Conservation in Camping*, which can be obtained free through your district or regional office of the Soil Conservation Service.

AMERICAN NATURE ASSOCIATION

Contact local member.

NATIONAL RECREATION ASSOCIATION

Contact local member or write: National Recreation Assoc., 8 W. 8th St., New York 11, N. Y.

THE IZAAK WALTON LEAGUE OF AMERICA

This organization has active youth chapters and active women's chapters in many states.

NATURE CONSERVANCY

Contact local member or write: Nature Conservancy, 4200 22nd St., N.E., Wash. 18, D. C.

FRIENDS OF THE LAND

Contact local member.

WILDERNESS SOCIETY

Contact local member or write: Wilderness Society, 2144 "P" St., N.W., Wash. 7, D. C.

WILDLIFE MANAGEMENT INSTITUTE

Contact or write to Wildlife Management Inst., 709 Wire Bldg., Wash. 5, D. C.

DUCKS UNLIMITED, INC.

Contact local member or write: Ducks Unlimited, Inc., 165 Broadway, New York 6, N. Y.

NATIONAL FOUNDATION FOR JUNIOR MUSEUMS

Contact local Junior Museum or write: National Foundation for Junior Museums, Inc., 26 Main St., Westford, Conn.

ADDITIONAL CONTACTS ON A LOCAL LEVEL

City Park Naturalists.
Citizens' Conservation Committees.
  (1) Mayor. (2) President of local sportsmen's clubs. (3) Women's Club. (4) Representative of Chamber of Commerce.
Supervisor of Parks.
City Engineer.
Regional, city or town planning boards.
Natural History Museums and trailside parks.
Parent-Teachers Association.
City highway departments.
Civil Defense.
Housing Development Administrations.
Citizen Committees with objectives similar to Camp Fire Girls Project (i.e. Community Service Committee, Denver, Colorado. Control of elm beetle).
Private foundations or institutions with wooded areas or "idle land."
Farmers with woodlots, or industrial tree farms.
Landscape architects.
City departments of health and sanitation.
Municipal water supply boards.
Seed companies and private nurseries.
Shade Tree Association.
Curators of private wildlife sanctuaries.

JOE VAN WORMER—FROM NATIONAL AUDUBON SOCIETY

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CAMP
FIRE
GIRLS

CAMP FIRE GIRLS, INC.
16 East 48th Street, New York 17, N. Y.